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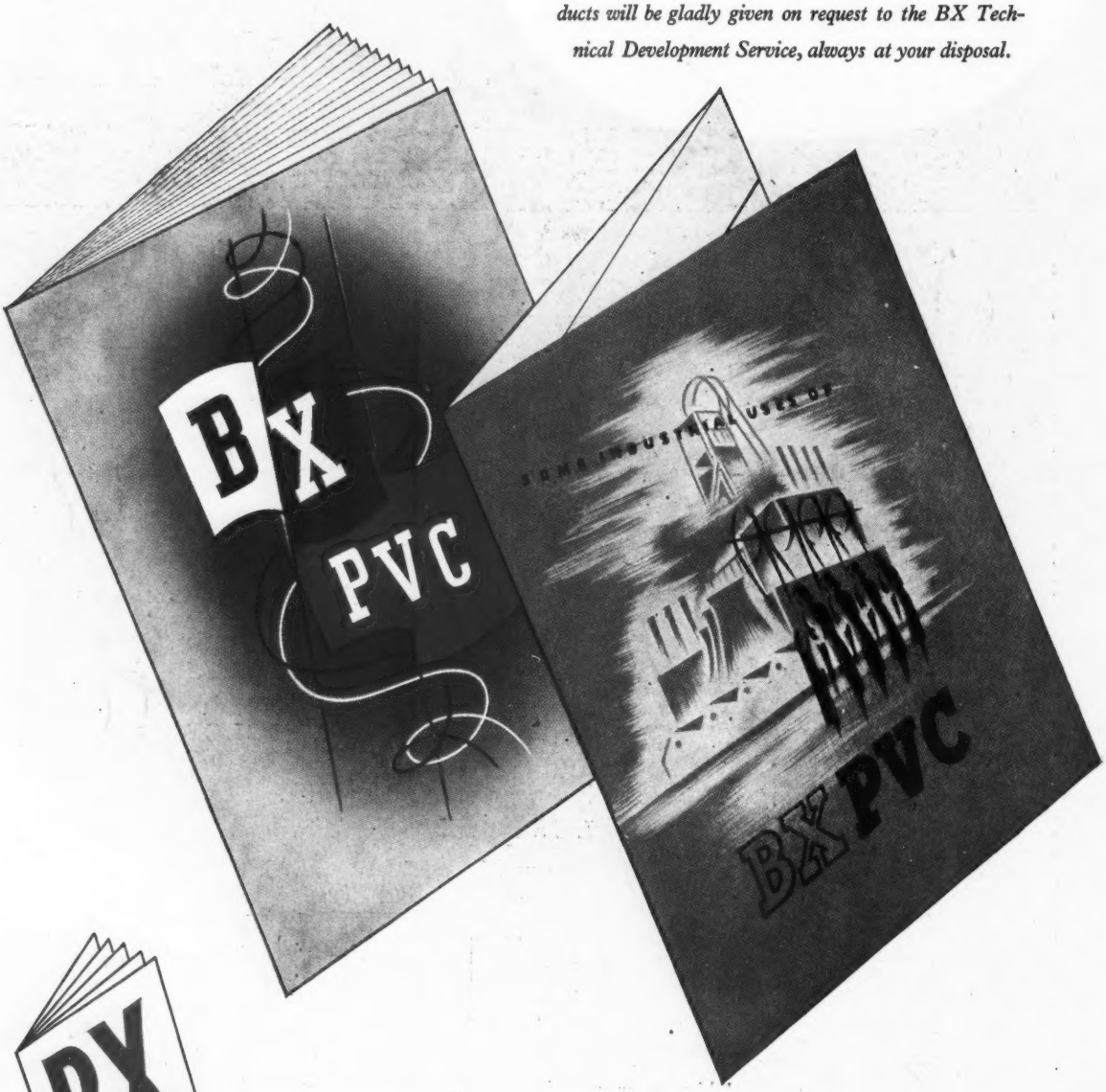

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WITH APOLOGIES

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Falls to earth abruptly, goodness what a shock !
But his shell is made of Rockite*
so it really doesn't matter,
Drop it, knock it, treat it rough,
this plastic doesn't shatter !

* Special, extra high shock resisting Rockite, of course, distinguished by the grade number 3932. It has an impact strength of 2.7 ft./lbs. three times greater than ordinary high shock resisting phenolic grades. What better material could there be for moulding hollow Humpty-Dumpty-like shapes, boxes, instrument cases, table tops, textile accessories, trays ? Write to BRP for full particulars.

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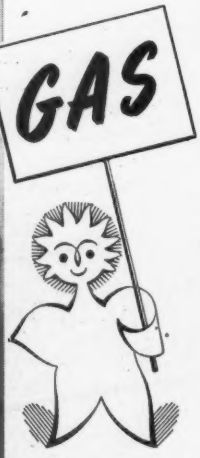

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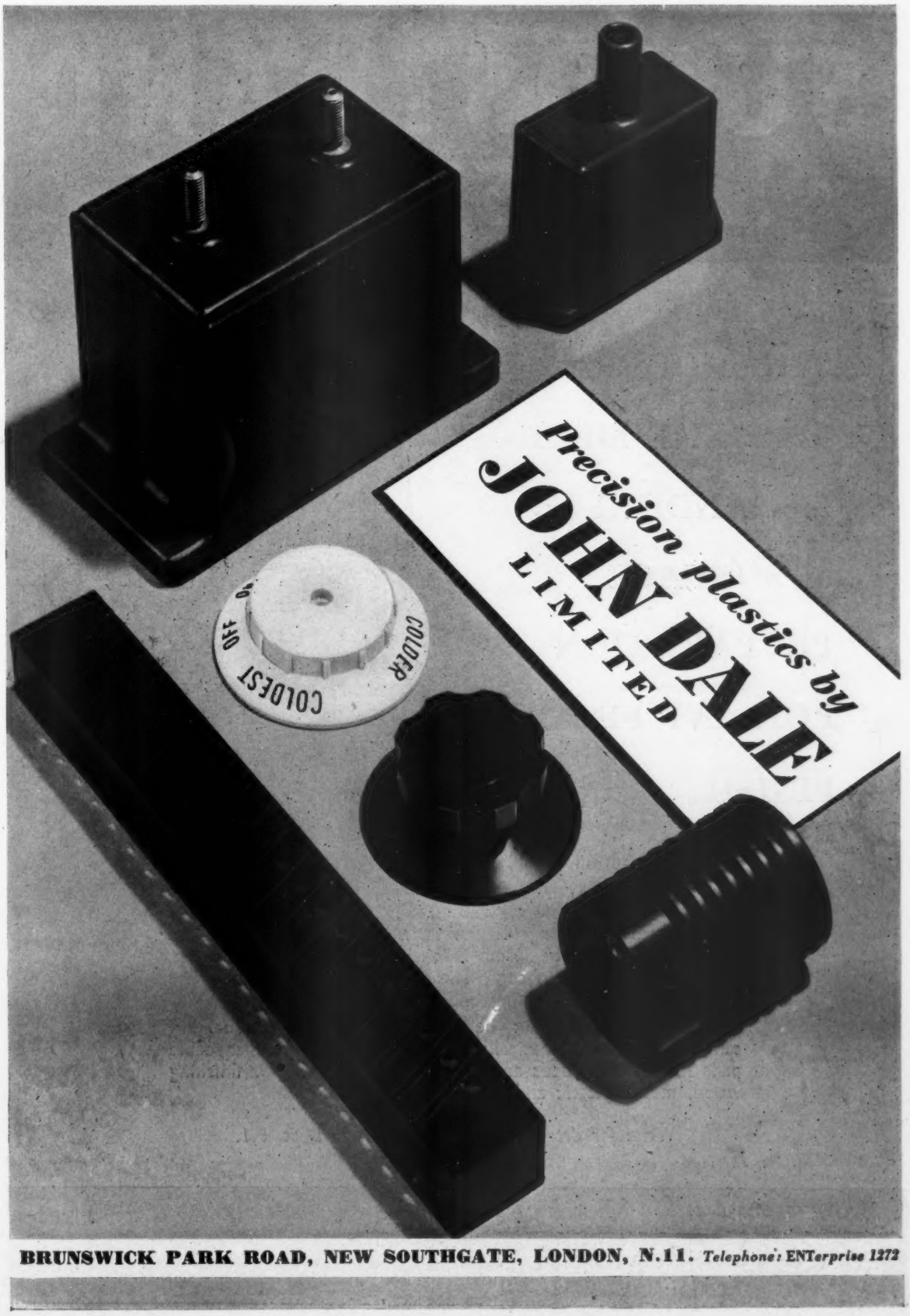

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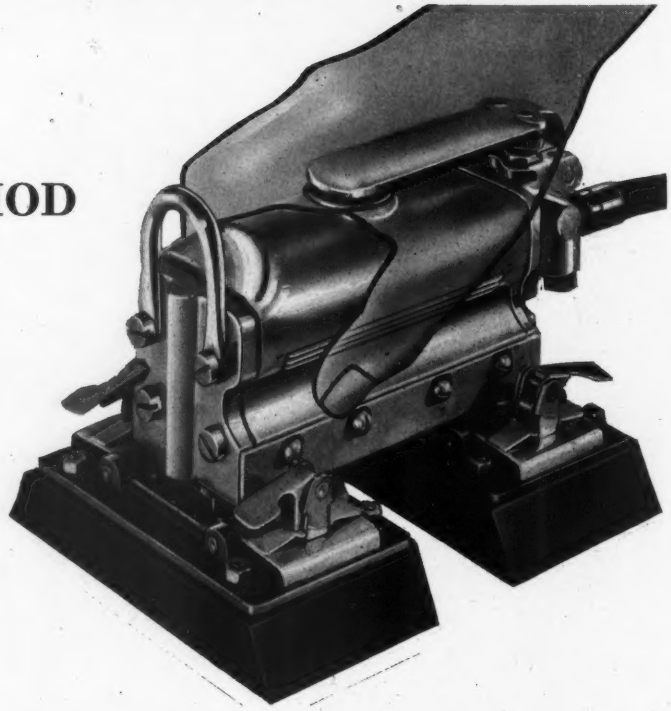

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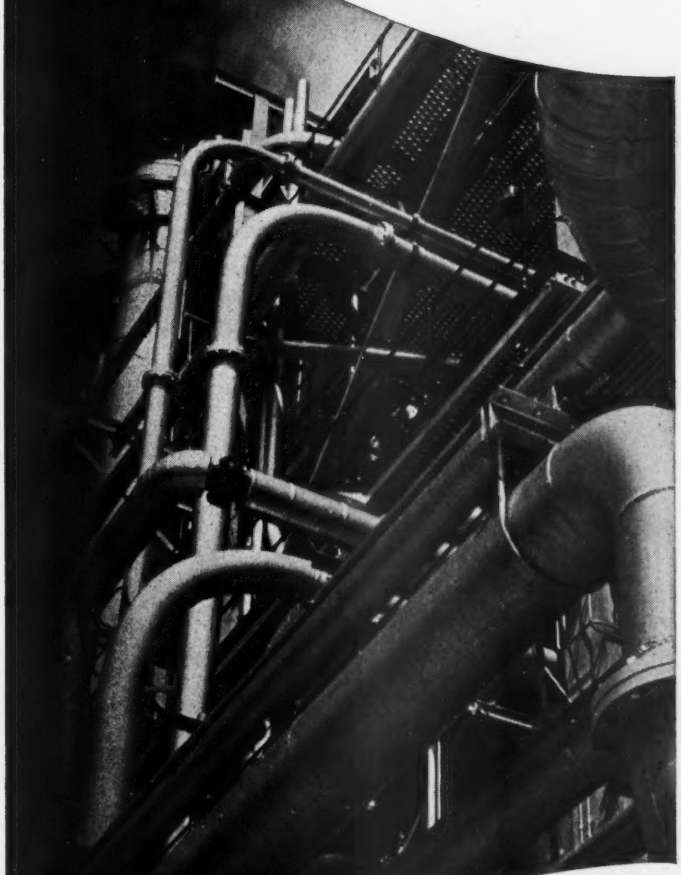

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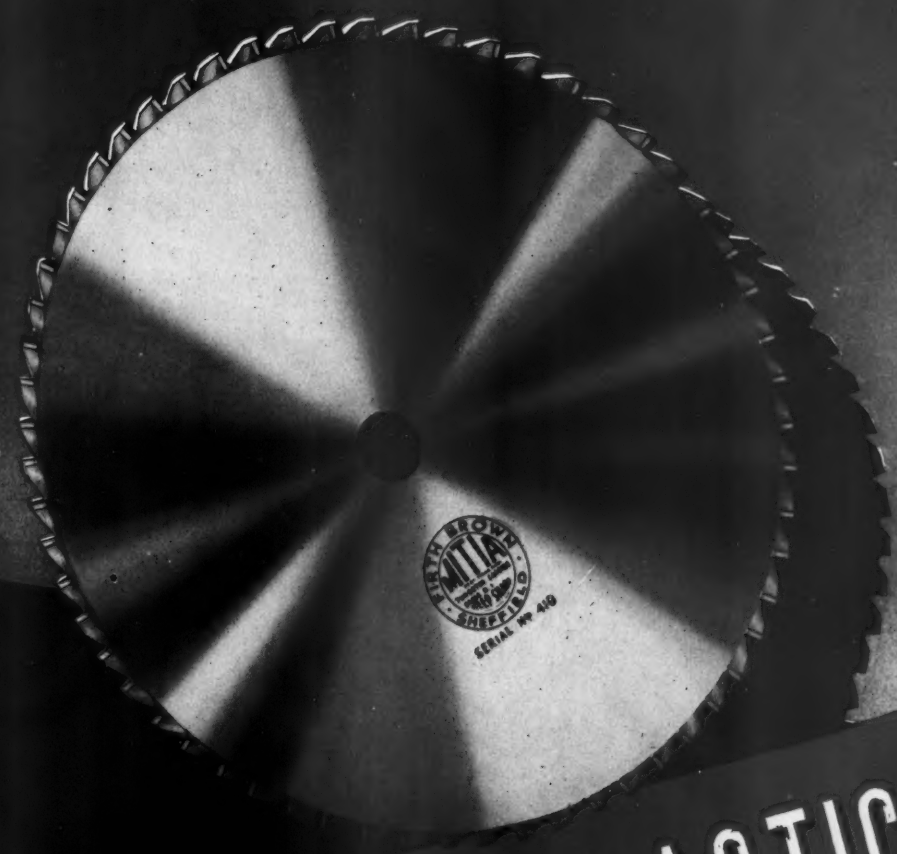

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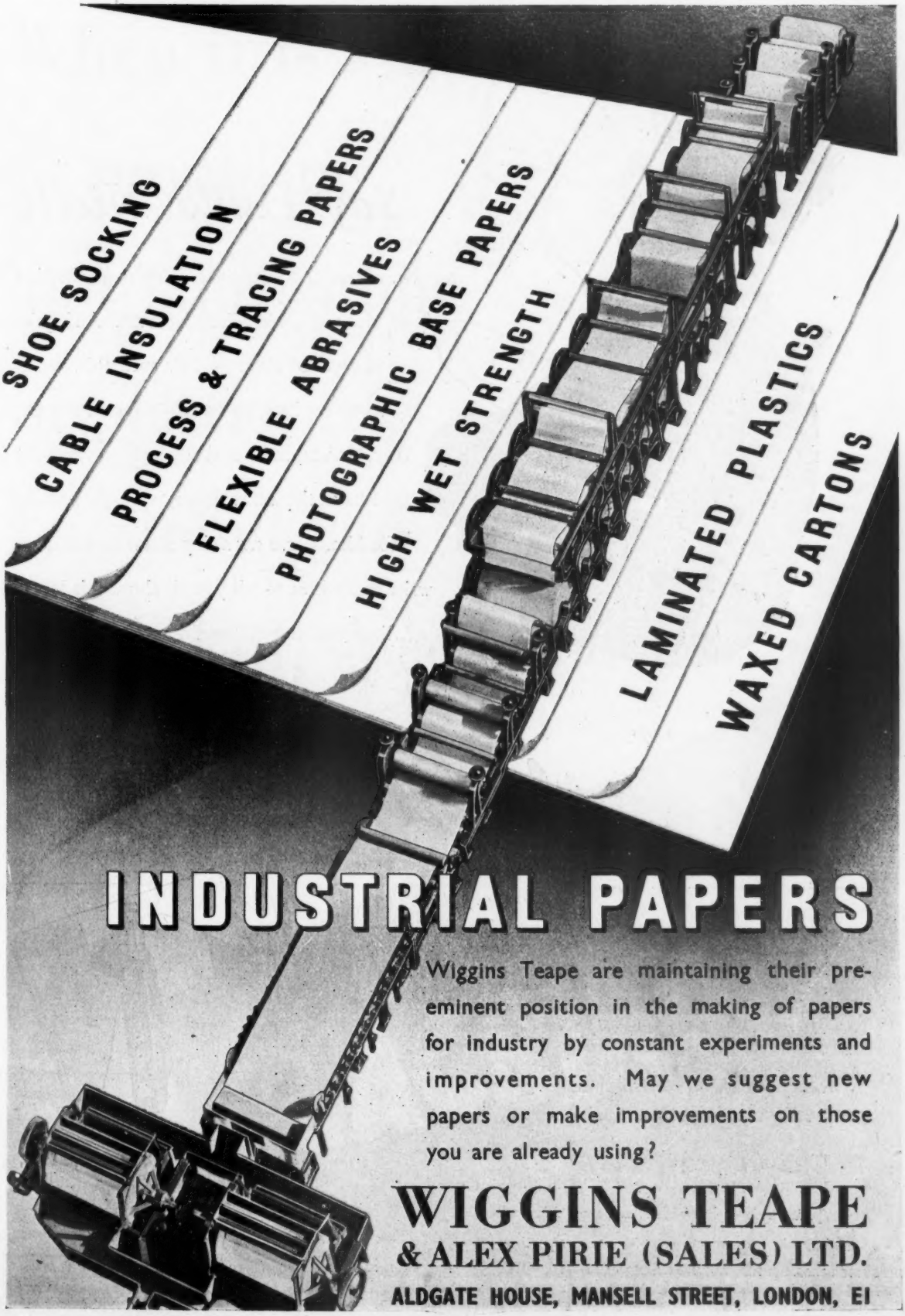

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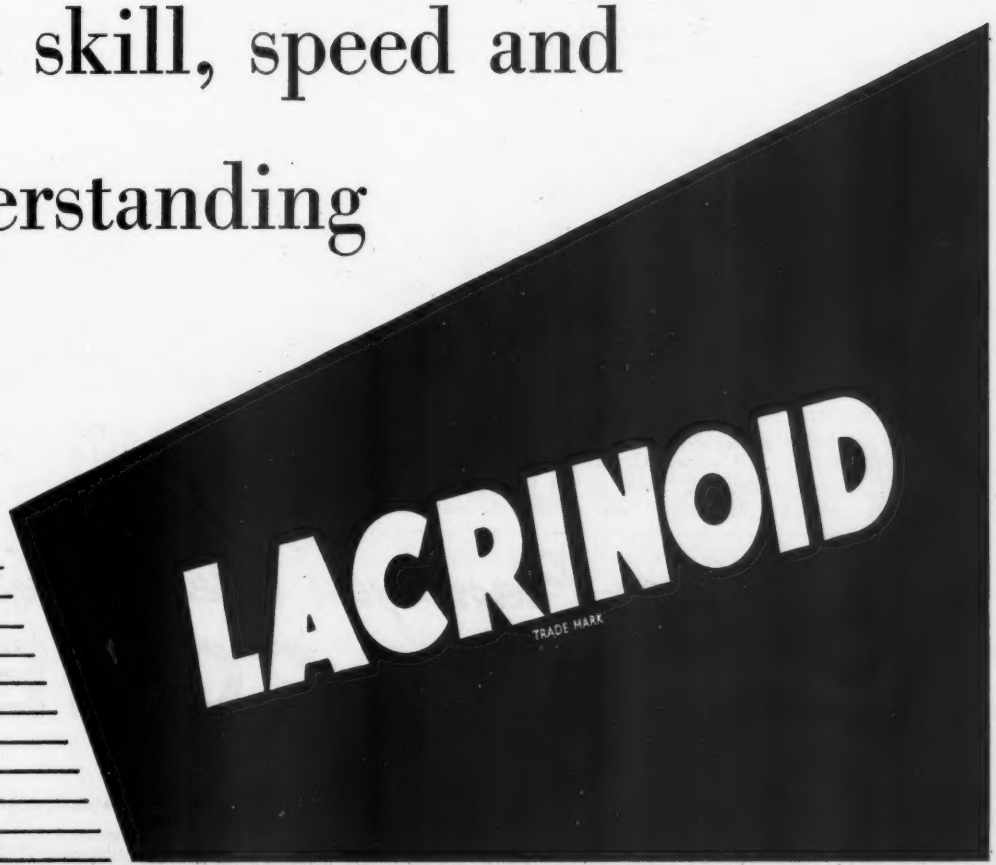

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PLASTIC MOULDING PLANT

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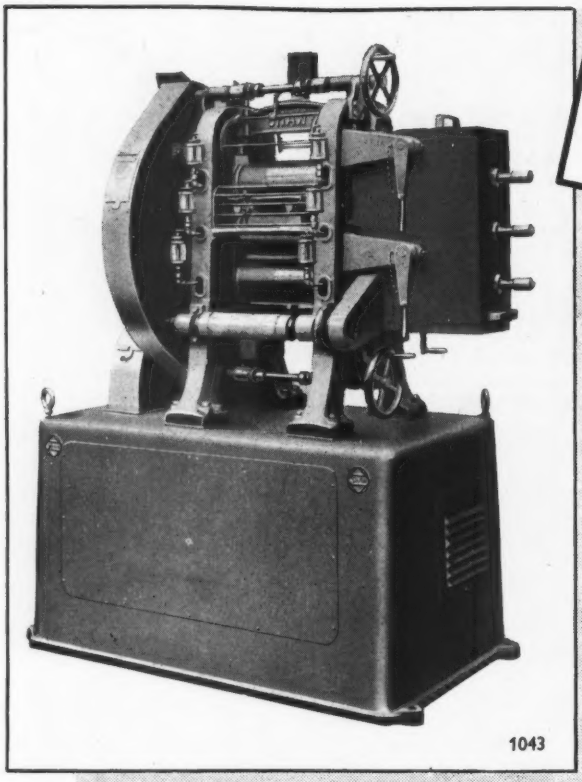
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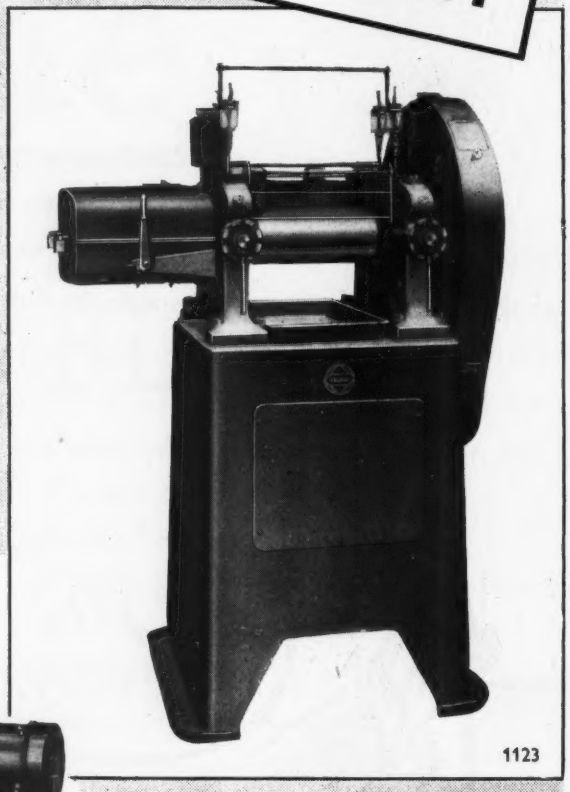
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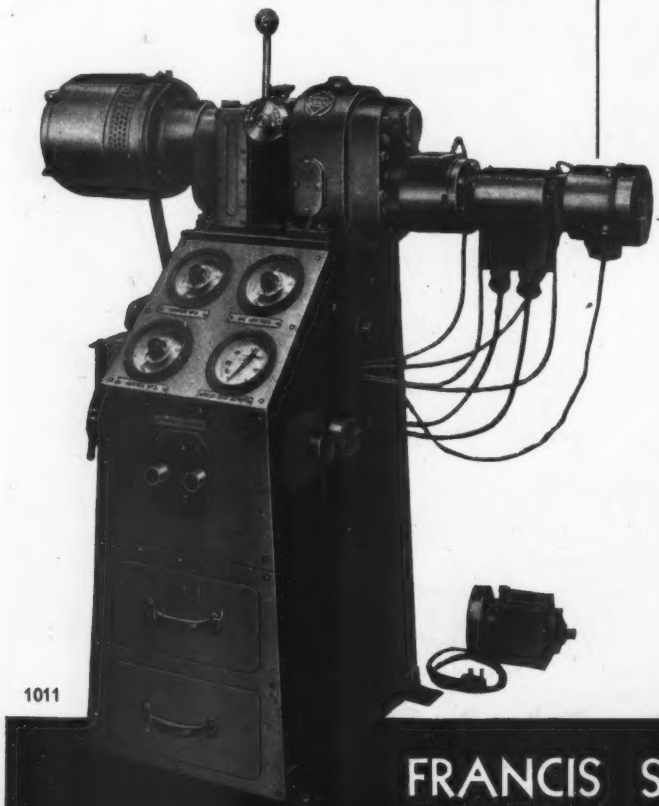
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The brave have died for it;
Foemen sought for it;
Honour the name of it;
Drink to the fame of it—
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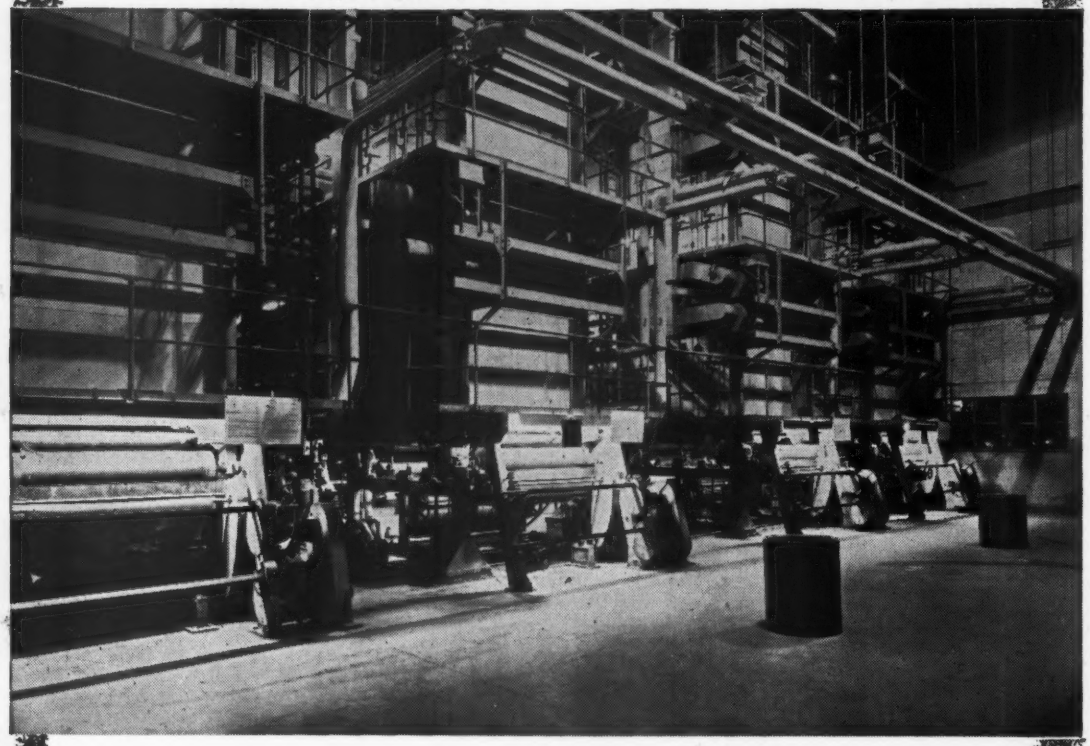

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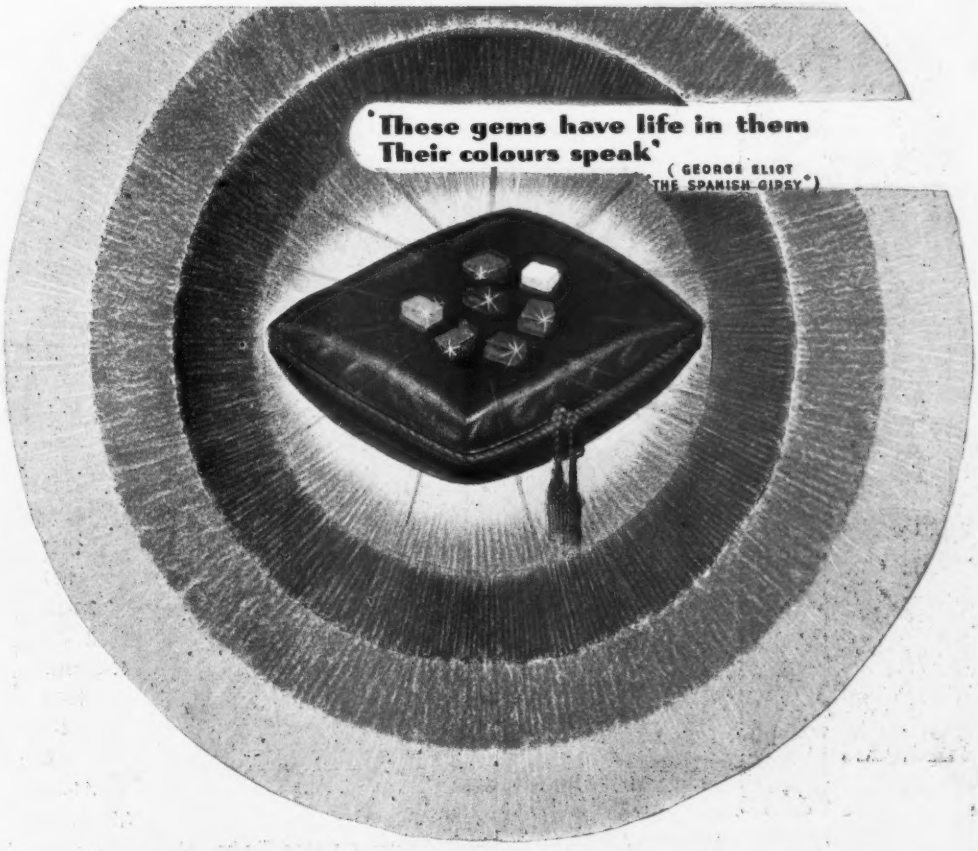

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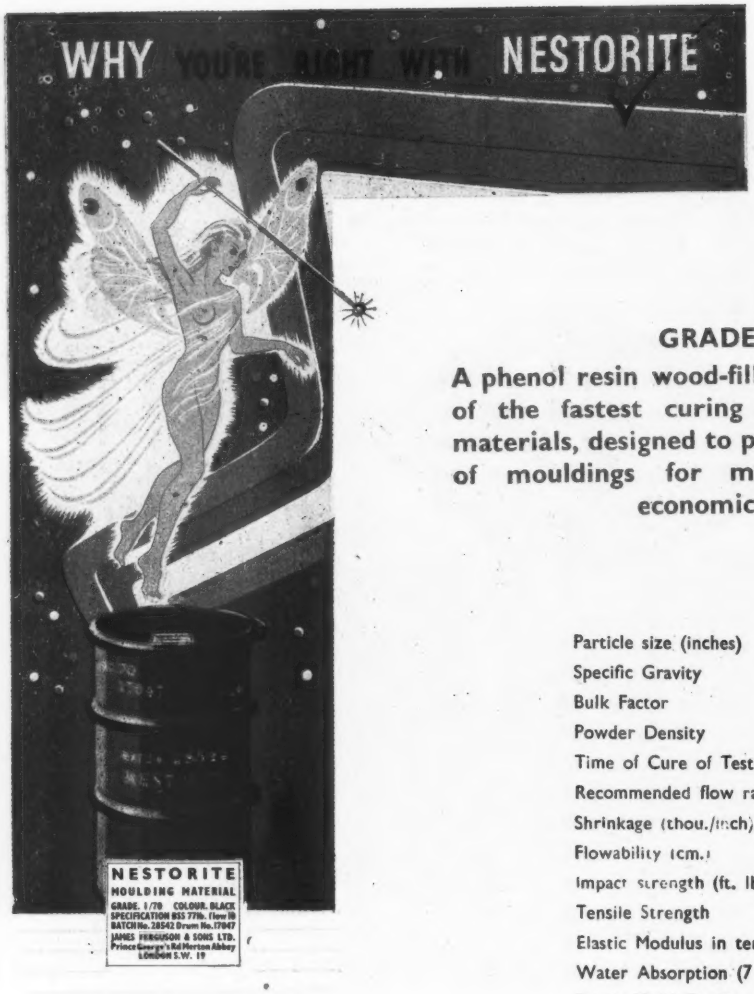
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Tensile Strength	6,000-8,000	
Elastic Modulus in tension (lbs./sq. in.)	2×10^6	
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Plastic Yield Grading (°C.)	140	
Blister Temperature (50° per hr. rise)	180-200°C.	
Shrinkage after heating 5" disc for 24 hrs. at 140°C.	2.4 thou./in.	
Electric Strength at 90°C. minute value (volts/mil.)	100-150	
Surface Resistivity after immersion (log 10^{ohms} cm.	10-11.5	
Volume Resistivity (as moulded log 10^{ohms} cm.)	12-13	
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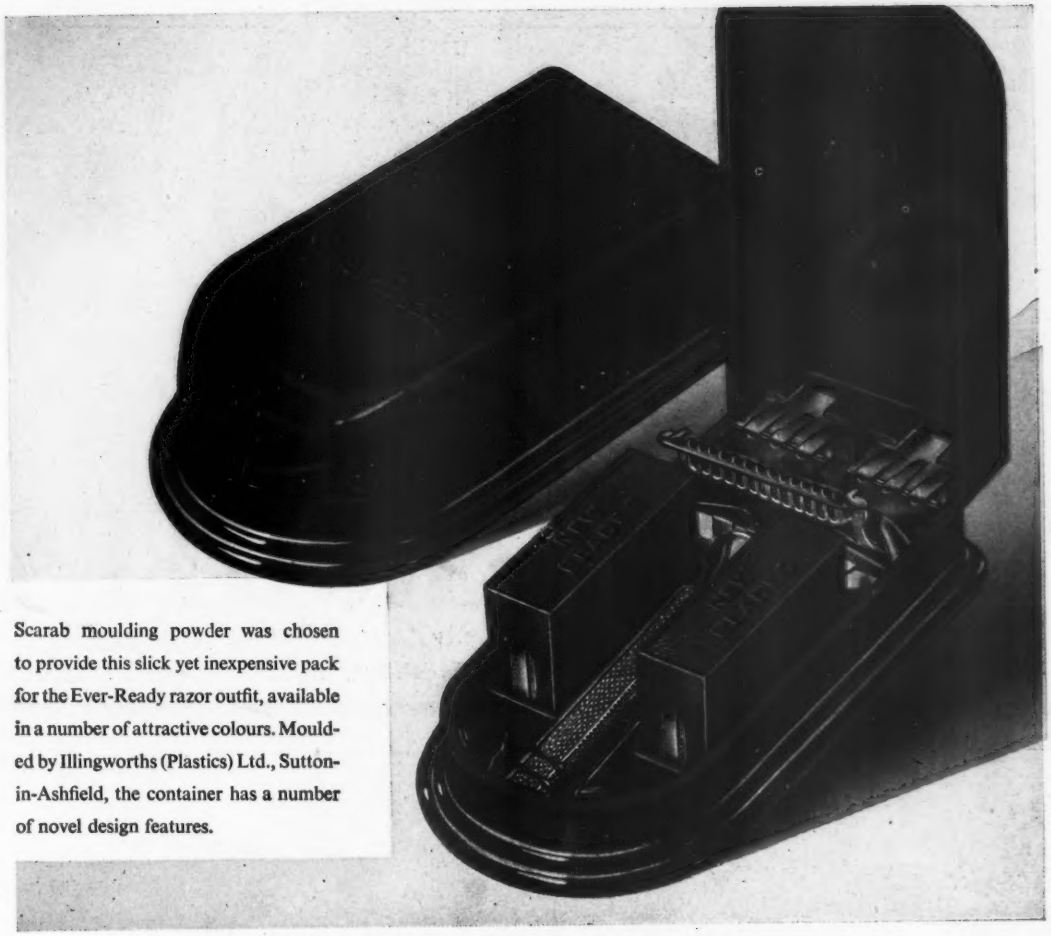

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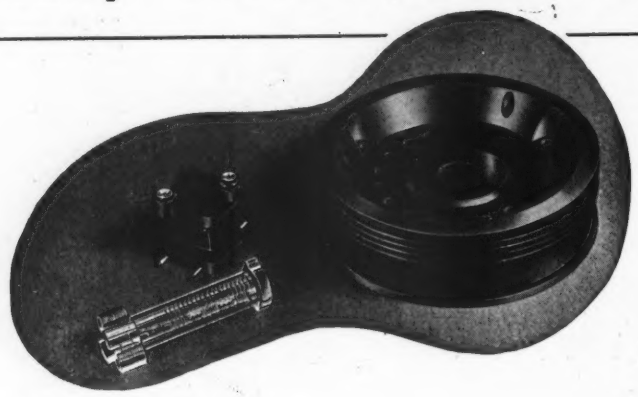

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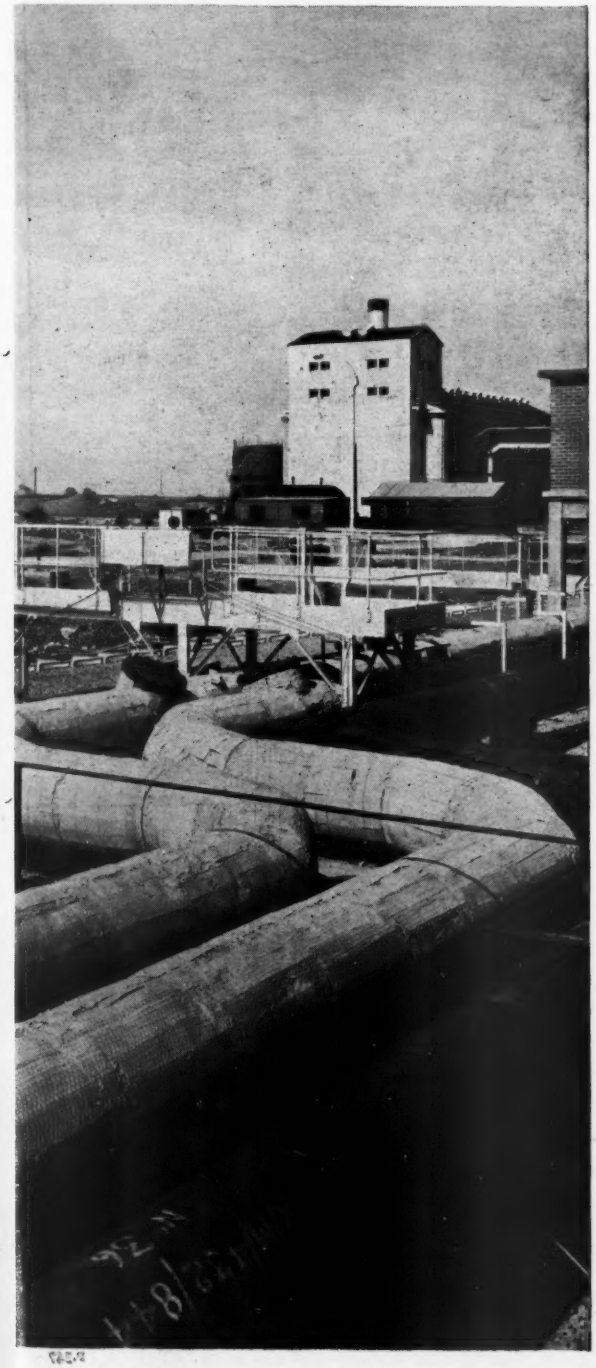

EDITOR: M. D. CURWEN, B.Sc., A.R.I.C.

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P.347

Plastics

VOL. XIV. No. 149. OCTOBER, 1949.

"We have much to boast of in this nineteenth century of universal progress—how much better off we are than our forefathers! Why, I was even shown the other day a quantity of so-called carved oak, machine-produced, 'to decorate the interior of a fine church' the supposed carvings in relief which were simply some composition stamped out under pressure; 'and mind you,' said the owner, 'you can't tell it from the real thing, and it only costs a third as much.'"

"On the Box Seat, from London to Land's End."
By James John Hissey. London, 1886.

EDITORIALS

Wilton Plant

THE opening of the new I.C.I. works at Wilton, in Yorkshire, should be a happy moment for the whole of the plastics industry, for even greater supplies of raw material will be available for the home and overseas trade. In the normal course of events, since in some cases new methods of production will be employed, costs should be lowered.

We on this journal have followed closely the growth of the present giant of the chemical industry and well remember, about 1926, the union of the few important chemical concerns in this country, Brunner Mond, United Alkali, British Dyestuffs and Nobels Explosives to form Imperial Chemical Industries. We then wrote that it was the greatest technical step ever taken in the British Empire and hailed it as a blessing for the country. Indeed it was, for without it the whole of chemical technology would have been throttled by German hegemony —most of our industries would have depended on German chemicals.

From its formation flowed many other benefits. The need for more chemists, physicists and engineers, awakened the universities to a realization of the technical future of the Empire. We were able to create a new body of workers—chemical engineers—to tackle the entirely new problems that arose. We were also able to foster the new industry of chemical plant production to feed not only the new chemical factories, but also those allied to it—from petroleum refining to dyestuffs manufacture, from dry-cleaning to sugar production. What I.C.I. has done for medicine, pest control, plastics and many other branches of our line is now history. Its expenditure of £4,000,000 per annum on research has stimulated others to understand the benefits of such work. Long may I.C.I. continue to travel along its road with the vigour it now shows.

On another page we describe in general terms the Wilton works and the products that are to be made there. Of outstanding importance is the fact that this country is now re-orientating its production—coal is now being reinforced by petroleum as a raw material. "Cracking" of oil—that is, the breaking up of petroleum to smaller, and, generally, unsaturated molecules—is an immense source of chemical wealth, a source tapped by the U.S.A. for the past 25 years. This method will now be employed in this country by several concerns, I.C.I. among them. From such use will flow a great series of chemicals, one of them, ethylene gas, being of special interest. Thus, polyethylene will be made from it, and not, as has been done in the past, from ethyl alcohol via imported molasses—a method which made us shudder in economic horror but which we knew was then unavoidable. From ethylene, too, will come ethylene glycol, an intermediate for the new British fibre, Terylene.

As further evidence of the energy with which this project is being launched, we may cite the construction of a 10-mile pipeline to carry the gas—propylene—to Billingham. It will pass through a tunnel under the Tees.

Radiolympia and the Motor Show

A HURRIED visit, on the eve of going to press, to these important exhibitions gives us an adequate idea as to how things are shaping.

What is most encouraging at Radiolympia is the fact that for the small radio set, almost all the makers produce one or more with the cabinet entirely of moulded plastics. The portable type also lends itself admirably to plastics, especially the thermoplastics, moulded, fabricated, or in strip form. We hope that one day the radio industry will see the value of laminates and the post-forming process.

As yet, although a few small television sets have plastic cabinets, the large types are of wood. In this respect we are behind the U.S.A., one concern utilizing a very large moulding—the largest ever made for the purpose.

More interest is being shown in magnetic recorders, and we note that the cellulose acetate tape is being employed here in addition to the steel wire and the paper variety.

As for the Motor Show, we note an apparent and regrettable decrease in the production of entirely plastic facia boards. There are a few, but the decrease appears to be due to the fact that the facia is more simply incorporated into the body structure when made of steel. However, the smaller instrument panel of plastics is quite general. It is interesting to note that both Standard Vanguard and Standard Estate cars have adopted p.v.c. sheet (Vynide) to replace leather trim when required. The replacement shows an advantage of nearly £13 in each case.

We hope to report in greater detail in our next issue.

Informative Labelling

ON another page in this issue we give a few details of the advisory programme on Informative Labelling inaugurated by the Society of the Plastics Industry of the U.S.A. With the kind help of Mr. Langdon, the P.R.O. of the Society, we have obtained permission to reproduce two pages which give tentative suggestions to the members.

If we may repeat here a criticism of one point, it is that of introducing chemical names to the public. It is true that only

a limited number are given and only relatively simple ones too. But even so, with time they will increase enormously and formidably and so introduce greater complexity. We cannot imagine that the public will ever understand their significance. What will also be puzzling to the public is the juxtaposition of such chemical names to trade-names.

On the other hand, it is worth trying to ascertain the reaction and it is an attempt to obtain clarity and to impart something of the character of plastics. Thus the public already knows that nylon is not only a material for making stockings, but also for making bristles or combs or beakers. It is not only a thread-like substance, but a substance from which thread or combs or beakers can be made.

Incidentally, we hope correct labelling will spread to Europe. While in Milan last month we purchased a beaker labelled "Made from Nylon." On examination we found it to be of polythene. The marks on the base were "Tumb-Flex. H.B.-N.Y." Presumably this is an American make.

It is pleasing to record how some of the American stores adopt their own method of ensuring quality. We have seen a pair of nylons sold by the famous Macy's, wrapped in a package and marked "First Quality Nylon—O'K'd by Macy's Bureau of Standards." If this is not good selling and good organization we don't know what is. Here, such "bureaux" appear conspicuous by their absence, although no doubt the big stores have their own methods of quality control.

MOULDING POWDER AND SHOT

Let's Go Gay

My strange photograph below shows a scene which the average intellectual reader will immediately recognize from the inscription on the window as the magnificent portals of the municipal philosophic and scientific library in Milan, opposite the Sforza Castle, where I sat last month to absorb the academic atmosphere. I took it to show how the stupid English have forgotten one of the little things that make life more tolerable and at the same time to make a little honest money on the side. I draw attention to the curious curtain which the obliging and smiling gentleman in the picture, with the almost snow-white apron (his mother obviously does not know of "Persil"), is holding aside to oblige me. It is of strip and chain aluminium, a most convenient thing for the ever open and yet shut door in a warm climate, admitting the cool breeze, excluding the unwanted blue-bottle and other things that fly. I remember in the early part of the century our village sweetshop had one of bamboo or glass beads. It was a delight to pass through it and hear the swish and tankle of the curtain. They were also seen in the far-off City of London, but they have all gone now. Not so with the French and Italians and, for all I know, with the Albanians, Greeks, Turks, Syrians, Argentinians, Paraguayans and other sensible people. What a wonderful export job for our extruders of p.v.c., polythene, acetate, phenolics, urea or, indeed, of any plastic! We could show them what colour could really do to cheer up the world!

Trade Names

While motoring through lovely Kent towards Tonbridge with the delightful Mr. Potter, of Micanite and Insulators, Ltd., to visit their resin-manufacturing plant, we passed a signpost and I read it. "Stop," I shouted. "Reverse, return! A discovery of importance." And when we had stopped, reversed and returned I pointed dramatically to the signpost. "Plaxtol . . . one mile." Surely it's the only village in the world with a ready-made trade-name—with a plastic or chemical flavouring. It will certainly amuse the owners of "Plax," "Plexon," "Plastol," "Plaskon" and "Plaxtol" and others in the U.S.A. and here. How strange, too, that nobody's ever used it yet. But I hope nobody ever will; for an editor's life is not worth a groat where trade-names are concerned. He dislikes them because they give no clue as to their chemical composition; he gets black looks if he forgets a trade-name, and is regarded as a nit-wit if he remembers it but forgets to put in the inverted commas and the capital letter. For those interested in place-names, "Plaxtol" is derived from the word "Playstool," meaning a place where the mediæval miracle plays were performed. Nowadays it is the scene of paper making and aniline resin production.

* * *

Open Sesame

We, many of our readers, and certainly one of the engineers of J. Jobling and Co., of Sunderland, whom we met last month at the BX research station, know that there seems to be a run on the use of magnets to make amusing toys. The use of magnetism is now suggested in B.P. 605,901 for a very novel application to dentures. Magnets in the upper and lower halves repel one another and therefore assist in retaining the dentures in position. The inclusion of metal may sound strange to some, since one of the advantages of the "acrylic" resins for the job was their lightness, so that the present invention induces a "status quo." We presume that the magnetic fields are not so strong as to prevent the owner from closing his mouth in the purely mechanical sense.

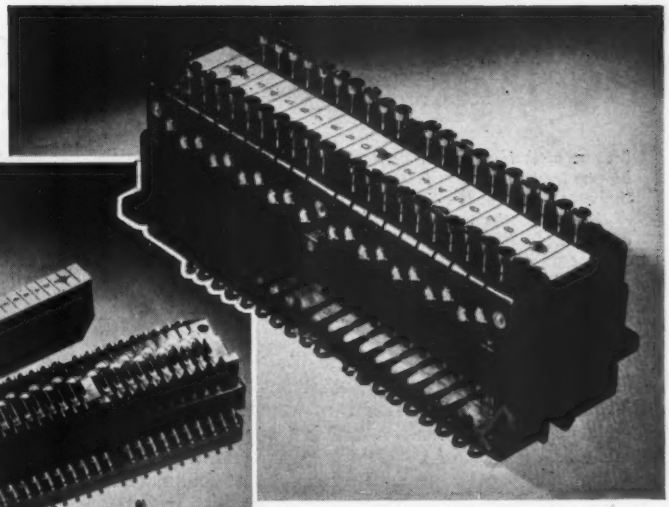
* * *

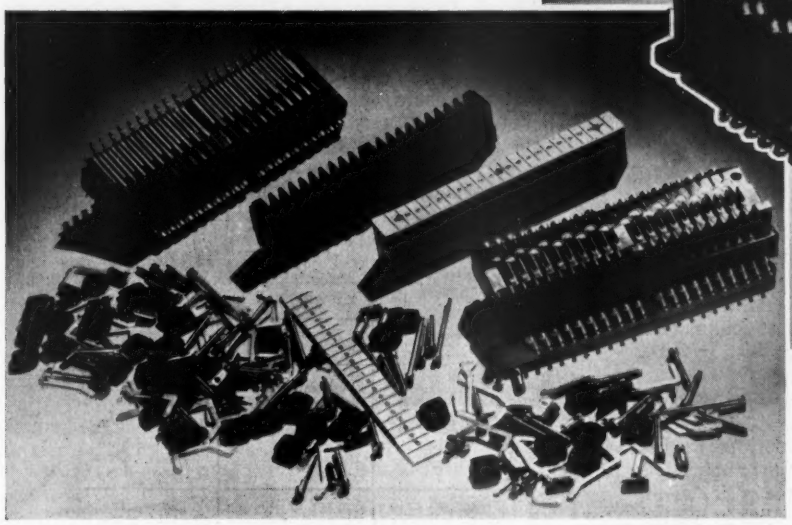
T.C.P. inter alia

One of our reader friends has taken our diatribes against the use of tricresyl phosphate in p.v.c. made for babies' pants as applying to all other uses. Let us assure him that t.c.p. is an excellent plasticizer for many industrial jobs and has, like most phosphates, the special merit of imparting non-inflammability, whereas many other plasticizers do not. In the same category trixylenyl phosphate, which has recently come on the market, has similar properties, has low volatility, and is free from odour. The last-named plasticizer therefore appears to possess advantages of importance over t.c.p.

DOGSBODDY.

(Right) One complete assembly of this G.P.O. terminal strip comprises a total of 225 parts, including 44 moulded pieces. (Below) Assembled side members, guide block, and label block; other parts scattered in foreground.





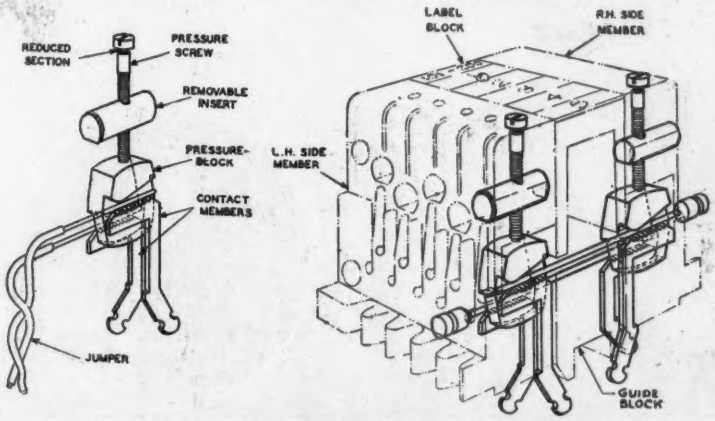
Terminal Strip for G.P.O.

IN our August issue, as one of the contributions to our new pictorial review, "Plastics in the Service of Man," we included a photograph of a terminal strip which is specially made for use by the G.P.O. Lack of space on that occasion prevented us from dealing further with this particularly interesting job as an example of plastics moulding, and we are now able to give further details.

Two designs of terminal strip—an open and an enclosed type—have been produced to meet the requirements of the G.P.O. The former was of 10 + 10 pair units; the latter, which has superseded the open type because of its greater compactness, is of 20 + 20 pair units; not only are twice the number of circuits accommodated, but a reduction in width has also been effected in the closed type.

The essential feature permitting the accommodation of 20 pairs of circuits in the space of 5¼ ins. is the simultaneous securing of both wires through the medium of an insulated block and a single screw, termed the pressure screw. The strip is constructed in four main moulded parts—left-hand and right-hand side members, label block and guide block. Both of the side members are fitted with 20 pressure blocks and associated contact members. Phenolic moulding material to P.O. Spec. Grade 1 (B.S. 771—GX) is used for moulding the main members and the pressure blocks.

Each side member contains a series of 20 similar rectangular cavities, at the bottom of which shaped contact members are set up at different levels, an intervening ridge being used to separate and insulate the contacts of a pair, within each cavity. Between the side members are secured the guide and label blocks, as shown. The former (lower) block is grooved to guide bridging pins from the contact members on one side to the corresponding contact member on the opposite side. The label (upper) block is hollow in section and serves to close each cavity and carry the face label running the length of the strip. Each cavity contains an elemental unit, also seen in one of our illustrations.



Details of enclosed-type terminal strip (courtesy, "Post Office Electrical Engineers' Journal").

The Streetly Manufacturing Co., Ltd., has been moulding and assembling the enclosed-type terminal strip for the G.P.O. since 1947. Each complete assembly comprises no fewer than 44 moulded pieces and a total of 225 parts.

The main body of the moulding is of a very complicated shape and into it are assembled 92 metal parts and 40 moulded parts. Consequently, extreme accuracy was required in making the moulds, which were laid down as transfer-type tools to give a more homogeneous product and to minimize the risk of breaking the many fragile and loose pieces and cores in the mould.

At Streetly a total of half a million parts have to be handled in the course of one week's production. Assembly is done by fairly elaborate jigs and assembly fixtures on a conveyor belt system; twenty-one operatives perform the 28 finishing operations, and every component is inspected twice during assembly.

This terminal strip is entirely designed by the G.P.O. Engineering Department for use in flexibility units for local line networks, and is covered by British Patent No. 20193/44. We acknowledge the kind permission of the Engineer-in-Chief, Cn. Branch, G.P.O., in being able to publish this information and the accompanying photographs.

L

Honeycomb Sandwich Construction

By G. MAY

Because of their extreme lightness, low-density laminates have become increasingly popular, although the wide field to which they may be applied is not yet generally appreciated. The author of this contribution, who is really the inventor of the process by which "Dufaylite" honeycomb core is manufactured, has made a very comprehensive investigation of the various ways in which this stabilizing interlayer may be combined with different sheet materials.

AN article on "Dufaylite" has already been published in "Plastics," July, 1946. Since that date there has been world-wide interest in this material, now manufactured under licence in many other countries, and in investigations on the strength characteristics of low-density sandwiches, it has been found that the honeycomb type of cellular structure, combined with suitable skins, provides a laminate which possesses an extremely high strength-weight ratio.

"Dufaylite" core is made from a carefully selected Kraft paper, specially treated with synthetic resin, and is supplied in convenient panels 3 ft. by 1 ft. in a variety of meshes, accurately cut to the user's requirements. As the applications of this material are now so numerous, it is the policy of the manufacturers, Dufay-Chromex, Ltd., to specialize in producing the core only, and the purpose of this article is to provide practical information in combining "Dufaylite" with sheet materials of various kinds, based on the results of a very comprehensive programme of experimental work carried out at the company's Elstree factory.

An efficient low-density structure comprises "Dufaylite" sandwiched between two sheets of material (generally referred to as "skins") and bonded to them by means of a suitable adhesive. While practical experiments and tests have been made with a wide range of adhesives and many have produced good bonds, the most successful laminates were made with the use of "cold setting" phenol-formaldehyde glues.

Such materials are readily available from several manufacturers. They are supplied in two parts; a liquid synthetic resin to which a measured quantity of "hardener" is added before use, but it is necessary to point out that when employing adhesives of this "chemical setting" type, the manufacturers' instructions must be carefully adhered to.

Designers and fabricators will be assisted in the selection of materials best suited to their requirements by the data given in Table 1.

Table 1.—Materials for Assembling "Honeycomb" Sandwiches, using "Dufaylite" as Core.

Skins	Preparation of Skins	Adhesives for Laminating
Wood, plywood, pulpboard, wallboard and other fibrous materials.	None, unless advised in the adhesive manufacturer's instruction leaflet.	"Cellobond" 266/4 (British Resin Products Ltd.) "Catacol" 688/P (Catalin Ltd.) "Bakelite" G.11178 (Bakelite Ltd.)
Sheet metals such as steel, aluminium, etc.	Prepare by laminating wood veneer or thin plywood to one side of sheet metal using the "Redux" process (Aero Research Ltd.)	As above, applied to the prepared side of the skin.
Compressed and resin impregnated boards.	Bakelite "wet abrasion" process.	"Bakelite" G.11178 (Bakelite Ltd.)

Flat Laminates

The simplest form of sandwich is naturally a flat panel, and there is the choice of various types of thin sheet materials

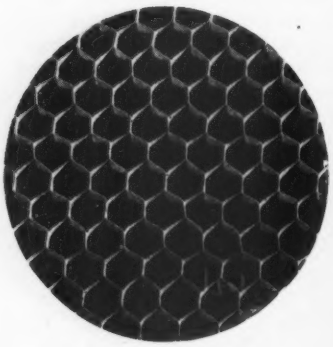


Fig. 1.—"Dufaylite," showing honeycomb structure.

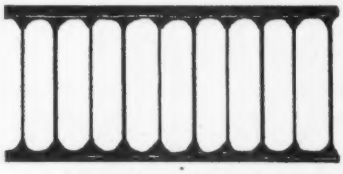


Fig. 2.—In "Dufaylite" the user obtains an excellent bond for sandwich construction due to the capillary attraction of the wet glue to the low-density core.

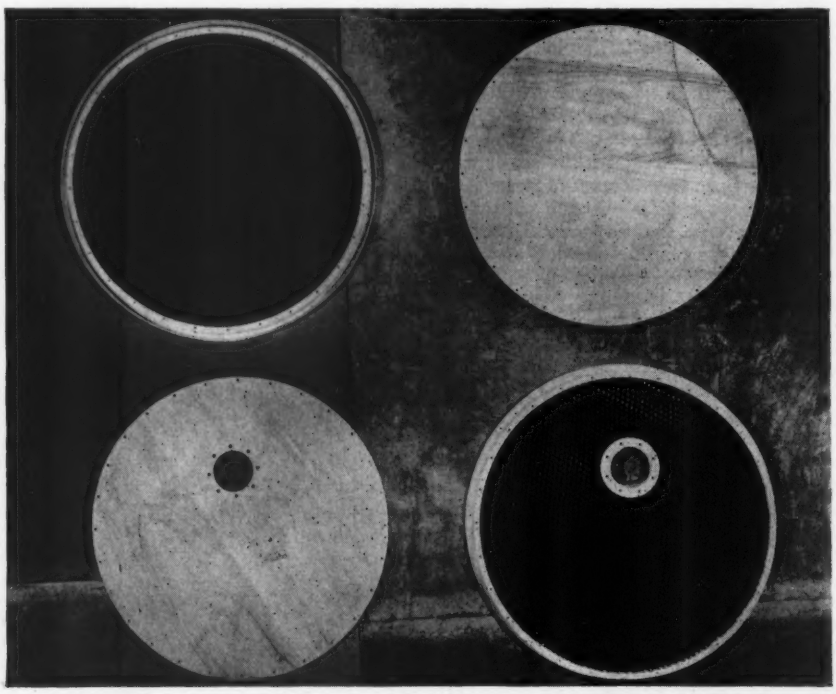


Fig. 3.—Metal bulkheads ready for assembly. Thin plywood has been laminated to the backs of the "Dural" skins. Note also the incorporated edge filling and insert.

First stage : Core glued to outside skin in the flat state.

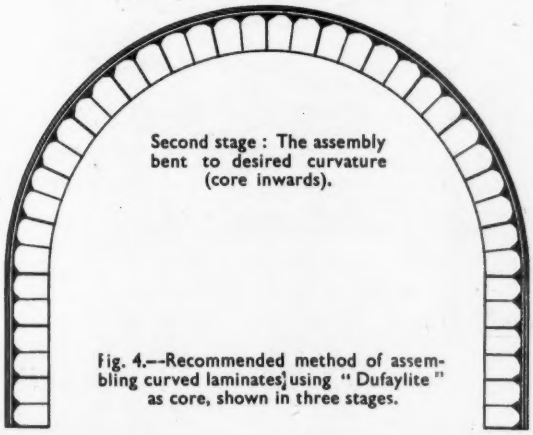


Fig. 4.—Recommended method of assembling curved laminates using "Dufaylite" as core, shown in three stages.

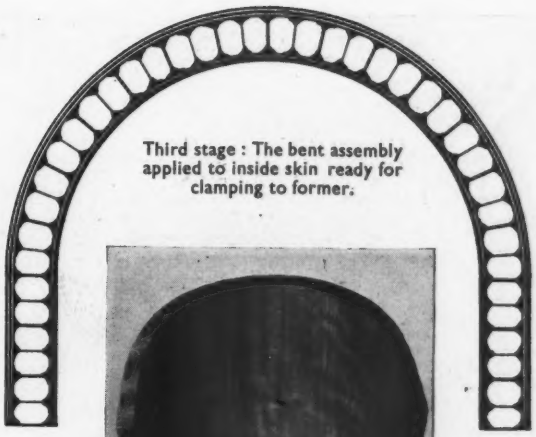


Fig. 5.—Single curvature structure ("Dufaylite" core) with the edge filling applied after laminating.

with which the honeycomb core may be combined in order to produce a lightweight laminate.

Assuming, for instance, that plywood is to be used, the most practical way to assemble the structure is firstly to apply a consistent coating of glue to one sheet of material. The "Dufaylite" core is then laid over this, with the panels arranged preferably so that they are lengthwise parallel with the grain of the plywood. A second sheet of ply, treated with glue, is then brought into contact with the honeycomb to complete the assembly ready for pressing.

At this stage it should be mentioned that the ideal bond is obtained when the viscosity of the wet glue is low enough to become attracted to the core, so that there is a substantial "build-up" around the edges of the cell walls where they come into contact with the skins, as shown in Fig. 2. Having a limited "shelf-life," cold-setting glues become more viscous with age, and it may be desirable to modify them with the use of wetting-out agents. In this respect much useful work has been carried out and patented by the "Plastics Section" of the Royal Aircraft Establishment at Farnborough.[1]

One of the advantages of "Dufaylite" core is that being consistent in thickness, only sufficient pressure is required to establish contact with the material to be used as skins, or to overcome any distortion in this material. A number of assembled panels can be held in simple "stack" presses until the glue becomes "hardened" at room temperatures (they are usually left overnight before unclamping); alternately, the process may be accelerated by elevated temperatures, using either a heated press or accommodating the clamped assembly in an oven for a given period.

Edge filling, and as in the case of flush doors, inserts for locks, etc., are incorporated as the panel is laminated, and it is advisable to have these slightly under the thickness of the core, any difference being taken up by the glue which is a good gap filler. An alternative method of sealing the exposed honeycomb is to glue the filling material to the edges of the panel after it has been laminated and trimmed or shaped.

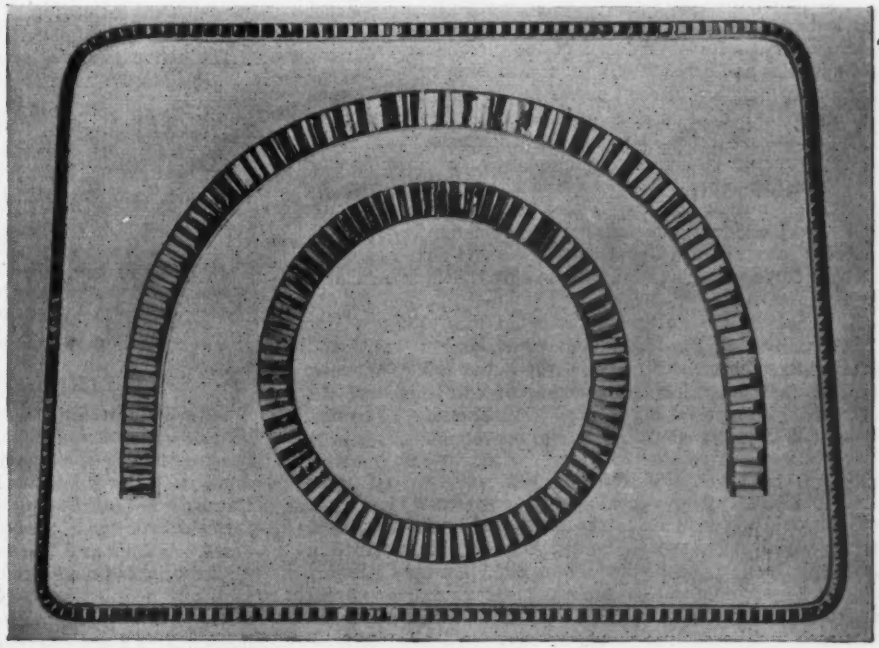


Fig. 6.—Sections cut from single curvature laminates made with "Dufaylite." Note the thinner core used for the curves of smaller radius.

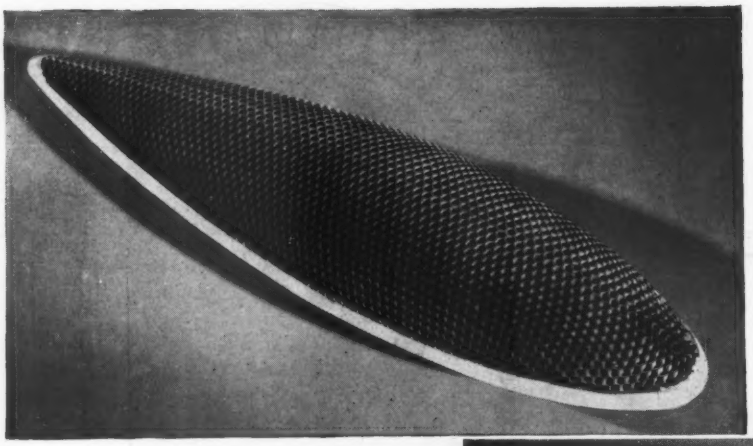
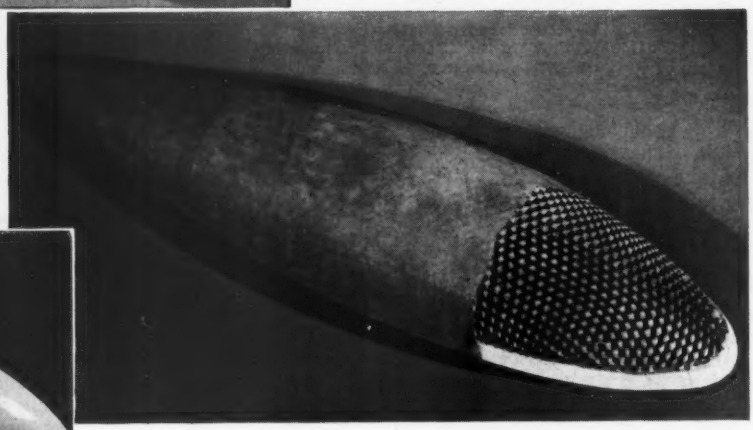


Fig. 7. — Experimental double-skin double-curvature structure (" Dufaylite" core)—aircraft faring—in three stages of construction.

First stage (left): " Dufaylite " core and edge filling glued to first skin of resinated paper already applied to the former.

Second stage (below): Second skin of resinated paper partially applied.



(Below) The completed faring after curing by heat treatment, and finished by spraying. It is interesting to note that no pressure was used in making this structure.

In considering the further applications of low density structures, the next stage of experimental work is carried out on curved laminates and a practical technique established for fabricating single curvatures. Successful structures were produced after careful observation of the directional properties of both skins and core. It was found necessary to arrange the skins with the grain at right angles to the direction in which the materials had to be bent, and also to have the panels of " Dufaylite " lengthwise parallel to this direction.

While curved laminates are in many cases made in one operation, the more advisable method is firstly to glue the core to the outside skin only. This is done in the flat state, and when the glue has hardened the combination is bent, with the core inwards, then applied to the second skin which has been prepared with glue, and the assembly is held in a suitable jig until set.

Thickness is the governing factor in the " stiffness " or " bendability " of the honeycomb panel, and it was found possible to achieve curvatures of 4½-in. radius using 1-in. core. Smaller radii necessitate a reduction of core thickness, for example, ¼-in. core for a radius of ½ in. The skin, of course, must be flexible enough to conform to the required curvatures.

Double Curvatures

It would hardly be possible to specify an assembly technique which would cover all structures other than single curvatures, as the variety of shapes is limited only by the imagination of the designer. The method of manufacture may possibly require to accommodate complications caused by complex and re-enterant curves and also the size of the structure, so that each multi-curvature should be considered separately.

Development work on the fabrication of double curvature cellular structures is in progress, and it has been found that the most suitable materials for skins are resinated paper, woven fabrics (including glass fibre cloth) and resinated asbestos felts. It is an advantage to use the honeycomb core in its uncured form; Fig. 7 illustrates the various stages in assembling a streamlined faring.

The above practical experimental programme was encouraged by Mr. Demetre Daponte, managing director of Dufay-Chromex, Ltd., in order to stimulate ideas for the future possibilities of lightweight structures. The writer also wishes to acknowledge his appreciation of the willing co-operation given by Bakelite, Ltd., British Resin Products, Ltd., Calalin, Ltd., and Aero Research, Ltd.

REFERENCE

(1) *Phillips and Pryor, " Glue Compositions." Information regarding Government-owned Patents available for industrial use is obtained from the Ministry of Supply, Patents 2(a), Melbourne House, Aldwych, London, W.C.2.*

SYNTHETIC RESIN SAND-CORE BINDERS

With the prevailing shortage and high price of linseed oil, considerable attention is being focused on the use of synthetic resins as binders for foundry sand-cores. Development leaflet No. 1 issued by The Beetle Products Co., Ltd., 1, Argyll Street, London, W.1, deals with the advantages offered by urea-formaldehyde resins, used in conjunction with a green-strength agent. As little as 0.5 to 1 per cent. by weight of resin solids on the weight of sand gives adequate bonding for any ordinary sand-core requirements. Cereals, starches, dextrines, clays, water-soluble gums, and soluble cellulose derivatives are employed as green-strength agents.

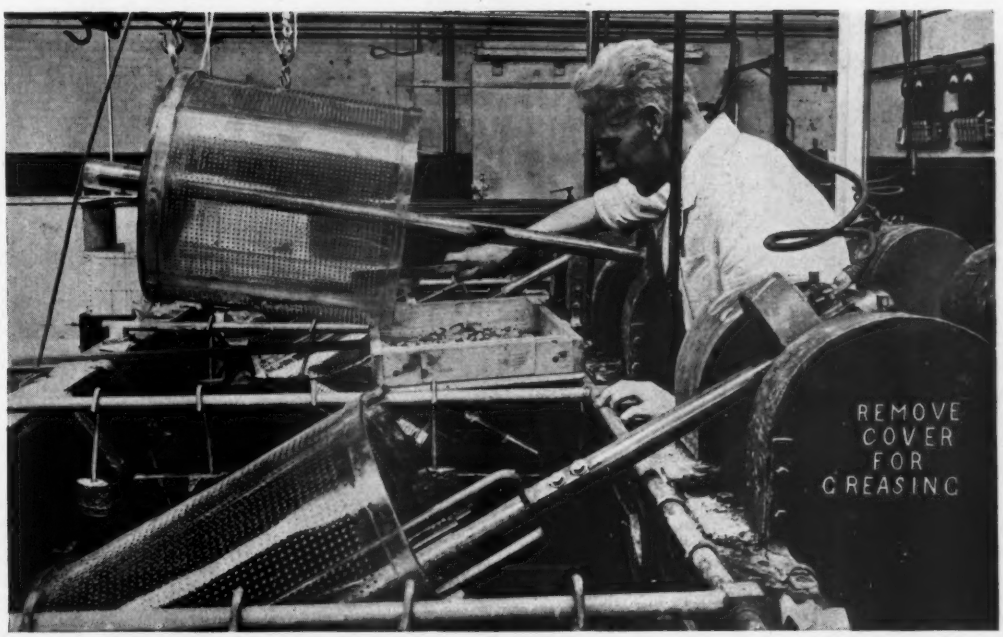


Fig. 1.—Part of the plating plant at the works of Metaplast (England) Ltd., showing rotating barrels in perforated "Perspex."

Modern Electroplating of Plastics

THE production of metallic film by electro-deposition has been carried out on the non-metals for many years, both from the severely technical point of view, such as on rubber and textiles for balloon covering, and in the electrical industry for capacitors or as shields, and, on the other hand, in the fancy goods trade where metallic effects are sought for on buttons, brooches and "jewellery." At various periods during the past 15 years some electroplating of plastic handles, e.g., motorcar door handles, has also been carried out.

From an economic point of view, however, it would seem that the greatest demand and possibilities lie at present in the fancy goods trade, and, in fact, it is to this trade that the industry of modern electro-deposition turns with considerable hope.

Apart from special advances made in the actual technique, what is most noteworthy is the adoption for the treatment of plastics what has long been common for the treatment of metals, namely, the introduction of more or less completely automatic plant. This has been due primarily to the necessity of production at low costs, which it does satisfactorily. It entails, obviously enough, the necessity also of large throughput, and also a careful study of the limitations of the type of object to be metal-coated so that it may accord with the general working of an automatic plant: the full benefit of such a plant cannot be achieved if the demands for electroplating are out of the ordinary—to exaggerate, if each object in a batch is to be "stopped" off at specified points with a protecting wax or other film.

There has also been considerable work done on the general limitations of plastics for the process of electroplating, since much depends (in the case of thermoplastics, for example) on the characteristics of some of the constituents, such as plasticizers, and their behaviour under a given set of conditions. All of which is very much to the point, and will give in the end the assurance of good results.

It was therefore with considerable pleasure that during a visit to the works of Metaplast (England), Ltd., a company that has recently begun activities in Harmondsworth, Middlesex, utilizing the well-known processes of the Metaplast Company, of New York City, U.S.A., we had the pleasure of seeing all these advances in action—careful segregation and examination of all plastics that are received for treatment, a completely novel process of preparing the object prior to the electro-deposition of the metal, and a completely automatic electro-chemical plant.

The Bonding Process

The most noteworthy aspect of the pre-treatment is that the normal graphiting process of obtaining a conducting surface is replaced by what is called a bonding process, which, in effect, is the deposition of silver by a method similar to that of the silvering of mirrors.

The objects, for example, buttons, are placed in large bottles to which are added silver solutions, special agents, and activators. The bottles are then laid on rotating rollers and spun for several minutes. Deposition of silver is immediate, but the rotation continues for a well-defined period until the desired thickness of metal is obtained. The buttons are then removed, excess silver solution being washed off and recovered, and the buttons are carefully dried; they then pass to the electroplating plant proper.

Automatic Plating Plant

The electroplating plant proper, seen in Fig. 1, has been constructed by W. Canning and Co., Ltd., of Birmingham, and is entirely automatic, with the obvious exception of the necessity for loading and unloading the rotating barrels which contain "the work," as also general supervision. Since the plastic objects receive an exceptionally strong and thick coating of the desired metal, namely, up to 3/1000 inch, they are in continuous immersion and rotation for many hours. Hence the economic necessity for automaticity in such a plant.

An interesting innovation is the introduction of the perforated "Perspex" barrels. This material is quite resistant to the action of the chemical solutions employed, and its tough nature stands up well to the continual mechanical

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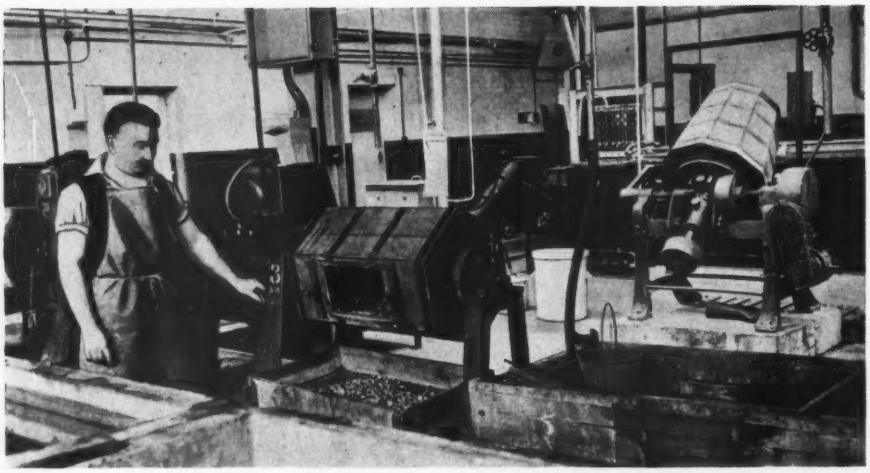


Fig. 2 (left).—Final polishing, tumbling and washing section. In the foreground the operator is seen emptying a barrel of buttons after washing them.

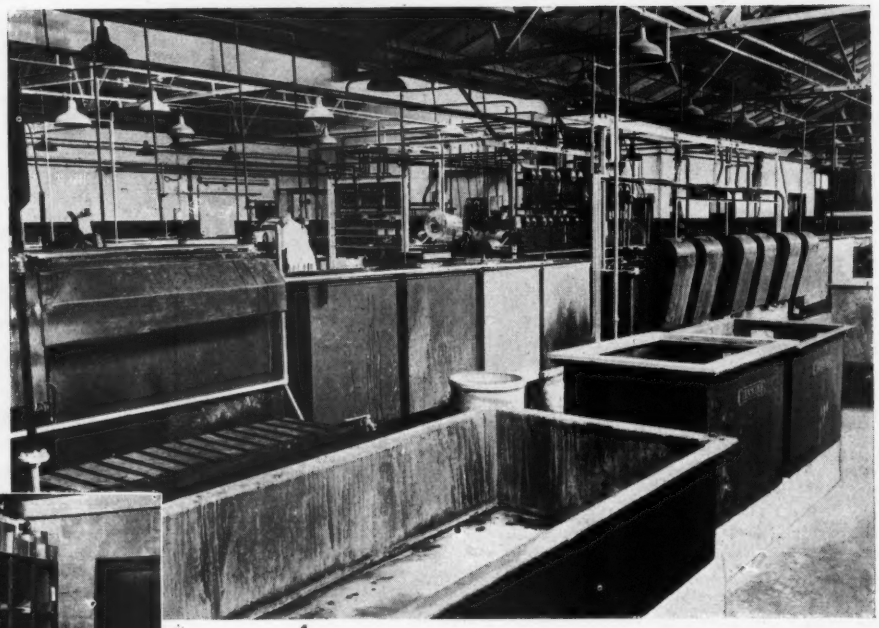


Fig. 3 (right).—General view of additional electroplating baths, where a large variety of colours are obtained.

Fig. 4 (below). — Inspecting, sorting and weighing electroplated buttons.

rubbing of the objects as they fall in the rolling action. Obviously, too, the transparency lends itself admirably to the necessity of keeping the objects under observation. After the period of deposition, the barrels are emptied into perforated trays made of "Tufnol," and are washed and dried.

A wide range of metals is deposited, and almost any desired colour can be obtained from pure copper to gold or silver, or modifications, such as "oxidized" metal effects. At this point we may mention that while the crux of the factory is the automatic plant and that the ideal objects for treatment in it are small ones in large quantities, yet the factory is also equipped with especially large plating tanks for electro-deposited metals on large plastic units, in fact, up to 2 ft. square. It will be seen, therefore, that the factory has considerable flexibility.

Silver Spray Process

In addition to the electro-deposition of metals, Metaplast, Ltd., have developed a special process of obtaining an exceptionally thin deposit of silver on plastics by purely spraying methods. The object to be coated is held by the operator in a special holder, and using a series of spray guns, it is treated successively with sprays of various solutions. The formation of silver is immediate, the thickness of film being almost monomolecular.

Obviously this process is comparatively low in cost, but also obviously, in view of the thinness of the film, is employed only for those objects which undergo little handling. Nevertheless it has considerable attractions to industry, for objects such as picture frames and other "static" pieces may be cheaply and rapidly silvered with films which are adequately strong enough for the purpose.

World's Industry Employs Plastics

GENERAL ENGINEERING

Simplified tooling for laminates. — H. W. Perry gives preliminary information on an economical method, by Republican Avia Corp., for making jigs and fixtures of low-pressure laminates, i.e., a glass cloth pattern combined with a thermosetting resin. Considerable saving in cost and time is claimed. (" Aircraft Engineering," 1949/June/193.)

Spinning technique.—Shaping of aircraft " rotoform " canopies by spinning sheets of " Plexiglas " at high speed, after sheets have been heated to a soft, pliant state, as carried out by Goodrich Aircraft Corp., Akron, Ohio, causes them to assume their final form by centrifugal force. (" Autom. Ind.," 1949/July 15/50.)

Tap cartridge for blind holes.—Efficient tapping of blind holes is now apparently solved by hard plastic extruded cartridge available in many types, diameters and lengths. (Tap Cartridge Co., 4208 Airport Road, Cincinnati 26, Ohio). The cartridge is placed in the hole and, during tapping, picks up all chips as they are produced and forces them to flow out of the hole. (" Modern Machine Shop," 1949/June/280.)

Designing for lower costs.—The American journal, " Product Engineering," devoted its June, 1949, issue to a survey of materials and constructions to lower the cost of products. It is concluded that plastics offer a profitable method of cost reduction in many applications, if the comparison is made on a volume basis. Among examples mentioned are the " Apex " automatic washer with " Fibreglas " moulded parts, and a combination of plastics and die castings in the new Coledo " Pre-Pak " scale. (" Product Engineering," 1949/June/106.)

Binder for sand cores.—A thermosetting resin, without filler, has been developed by Plastics Dept., American Cyanamid Co., New York, as a water-resistant foundry core binder. Thus the foundry is able to vary the green and baked strength of their cores, as well as hardness, permeability, and collapsibility. The baking time is said to be reduced by 33 to 50 per cent. (" Autom. Industries," 1949/May/70.)

Injection moulding. — R. Rapp has compared the capacities of a number of American injection moulding machines. Components up to 3,500 kg. can be produced on large machines, generally with oil-hydraulic operation. (" Kunststoffe," 1949/Aug./181.)

Hobbing.—Short account of the hobbing method, with notes on the steels to be used for the hob and for the mould, as well as on the presses, has been published in " La Machine Moderne," 1949/May/24.

Electrically heated moulds. — K. Brandenburger describes a new mercury-operated relay for temperature control, which is said to be less expensive than the usual electromagnet relay. (" Kunststoffe," 1949/Aug./187.)

Transfer moulding.—K. Brandenburger, a pioneer of transfer moulding for thermosetting resins, reviews its development from primitive beginnings to present perfection. (" Kunststoffe," 1949/Aug./189.)

New radial saw is said to facilitate the sawing of plastics and similar materials; a yoke offset from the centre pivot allows cuts to be made in all directions. Depth of cut is 3⅛ ins. for a 9-in. diameter saw. (" Tool Engineer," 1949/Aug./68.)

ELECTRICAL

Plating plastics.— Description of the Cupron process (Electrochemical Industries Inc., Leominster, Mass.), was given by H. Narcus before the 35th annual convention of the American Electroplaters Society. It is said to be applicable to large-scale production operations in plating many types of plastic parts. (" Products Finishing," 1949/June/94.)

Electroplating anode bags of nylon can be used to cover nickel, copper, silver, zinc and other metal anodes in electroplating practice. The nylon bags (produced by Euthone Inc., 442, Elm Street, New Haven, Conn.) are stated to be stronger than comparable cotton bags. Strength is maintained in both acid and alkaline solutions up to 150 degrees F. (" Products Finishing," 1949/June/136.)

Electrical insulation.—As one of the contributions to the VDI Convention at Dusseldorf, September, 1949, Th. Gast, Karlsruhe, spoke about electrical fine measurement on plastics, and discussed two new measuring methods: (1) The recording of highest values of insulation resistance by an electrostatic measuring transformer for determining homogeneity and measuring the surface resistance; (2) The electrical measurement or recording of a wide frequency range. (" VDI Zeits," 1949/**94**/360.)

Sound records.—H. G. Eilers and G. Schoettler have discussed new sound-free materials for records (in particular vinyl resins), the use of nylon needles, and improvements in methods of pick-up. For vinyl resin records sapphire needles are preferably used; for especially light, in particular electro-magnetic pick-ups, steel needles and heavy pick-ups would scratch the record. In the new Columbia record, according to P. Goldmark, microgrooves of 75 microns width are used compared with 125 microns normal width, with reduced speed of rotation and longer playing time. (" VDI Zeits," 1949/**91**/23.)

MISCELLANEOUS

Plastic workman's apron with electronically sealed edges, available in two standard sizes (Forbes Products Co., 625 S. Goodman Street, Rochester 7, N.Y.) is said to be extremely tough and resistant to many fluids. (" Modern Machine Shop," 1949/June/306.)

Safety goggles for eye protection in grinding, spot-welding and similar operations are made of one-piece lens " Monogoggle," which is claimed to offer wide and clear vision, with ample eye protection. The producers are Willson Products, Inc., Reading, Pa. (" Modern Machine Shop," 1949/July/285.)

Ultrasonic lenses.—D. Sette describes some experiments on ultrasonic lenses of plastic materials, and states that a plano-cylindrical or a plano-spherical lens permits a reduction to 1/10 or 1/100 respectively of the energy which must be emitted by a quartz crystal to produce a given intensity of ultrasonic radiation over a given region. (" Acoust. Soc. Amer. J.," 1949/July/375.)

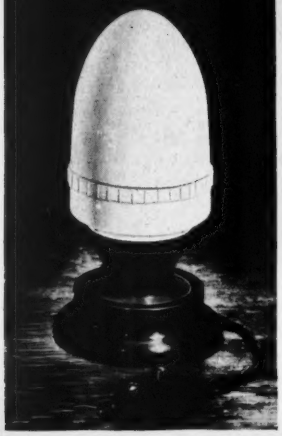
Hardened softwoods.—Western Pine Association's new process combines high pressure and high temperature, whereby softwoods are said to be converted into a substance so hard that a nail cannot be driven into them. Pressure of 1,500 lb./sq. in. and 325 degrees F. temperature cause the lignin resin to flow and serve as a cementing agent. (" Business Week," 1949/May 28/32.)

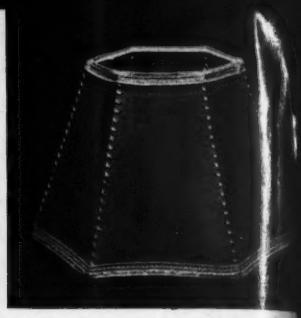
Allyl starch employed as a baked lacquer or enamel (General mills Research Lab., Minneapolis, Minn.) produces hard, tough but flexible, and water-resistant films. Duration of baking is 90 mins. at 230 degrees F. or 45 mins. at 255 degrees F. (" Materials and Methods," 1949/July/95.)

PLASTICS
IN THE SERVICE OF MAN

A pictorial review of high-quality units moulded or otherwise fabricated in Great Britain . . .

3. Domestic Equipment



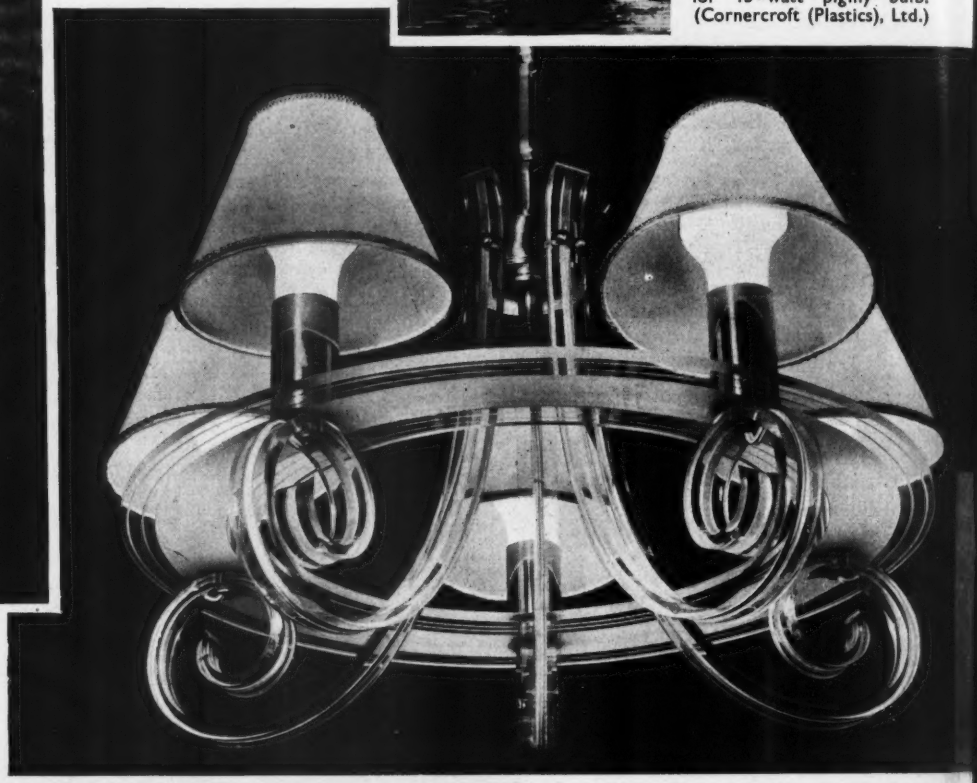


(Above) Lampshade in cellulose acetate sheet. (Utilex, Ltd.)

(Left) Portable electric light for 15-watt pigmy bulb. (Cornercroft (Plastics), Ltd.)

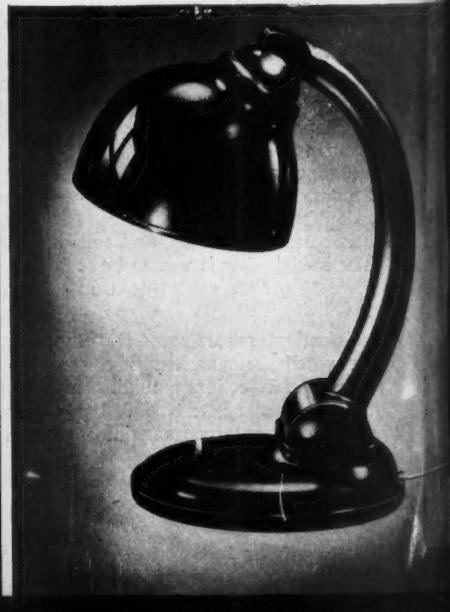
(Above) Electrolier of moulded transparent plastic, as exhibited at 1949 B.I.F. (Stone and Simmons.)

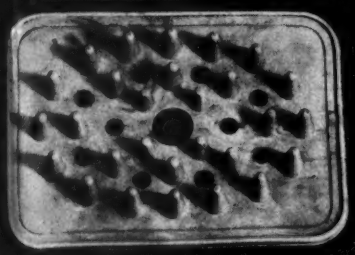
(Below) Lampshades in "Crinothene" (polythene sheet) as made by Godfrey Lampshades, Ltd. (Photo: courtesy, I.C.I. Plastics Division.)



(Above) Electrolier (lighting pendant) fabricated from "Perspex" strip, with special grooves to house the wiring. (Falk Stadelmann and Co., Ltd.)

(Below) Table or desk lamp of all-plastic construction. (E. K. Cole, Ltd., Plastics Division.)





(Right) Broom-handle cap in p.v.c., injection moulded by J. F. Kenure, Ltd.

(Below) Darning help, moulded in phenolic for F. W. Woolworth and Co., Ltd., by Stadium, Ltd. ("Plastics." 1947/249.)

(Right) Polystyrene clothes peg, (Airfix Products, Ltd.) ("Plastics," 1947/492).

(Above) Soap economizer, injection moulded in flexible p.v.c. by J. F. Kenure, Ltd., using "Kenutuf" flexible injection moulding process.

(Above) Vacuum jug made for British Vacuum Flask Co., Ltd. (Crystalate, Ltd.)

(Above) Shampoo spray for Rilling-Hills, Ltd., the head moulded by Universal Plastics, Ltd. ("Plastics," 1947/249.)

(Left) Vacuum flask for John F. Thomas, Ltd. (British Artid Plastics, Ltd.)

(Below) Automatic scales for George Salter and Co., Ltd., with scoop, body and base moulded in urea by Streetly Manufacturing Co., Ltd. ("Plastics," 1948/595.)

(Above) Receptacle used for cleaning dentures, moulded in polythene by Tamworth Plastics, Ltd. ("Plastics," 1949/Feb./92.)

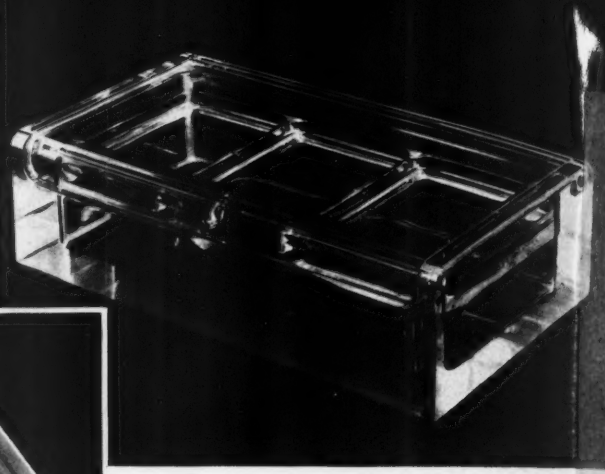
(Above) Lavatory seat for child, in post-formed laminate. (Thermo-Plastics, Ltd.)

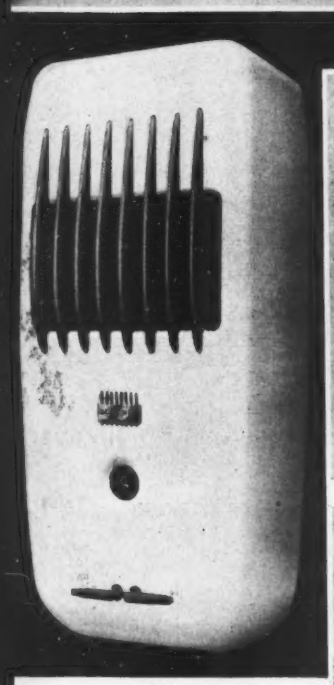
(Right) "Ducky"—article of utility for small children, moulded in "Scarab" by Aeroplastics, Ltd., for Roy Aitken and Co. ("Plastics," 1949/June/329.)

PLASTICS
OCTOBER, 1949

(Left) Saucepan handle sheathed in hard p.v.c. (Creators, Ltd.) ("Plastics," 1949/July/373.)

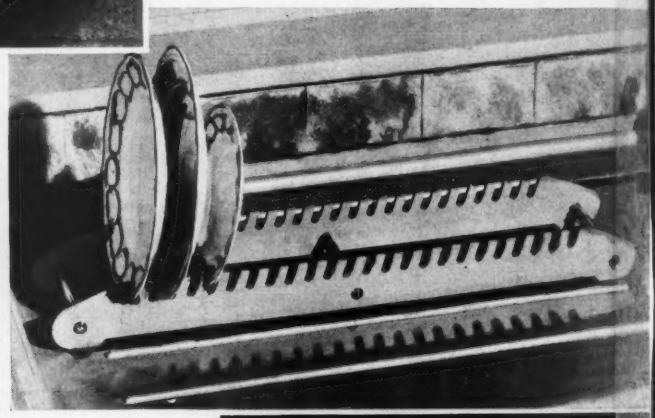
(Right) Cigarette or trinket box, machined from "Perspex," by J. Starkie Gardner, Ltd.





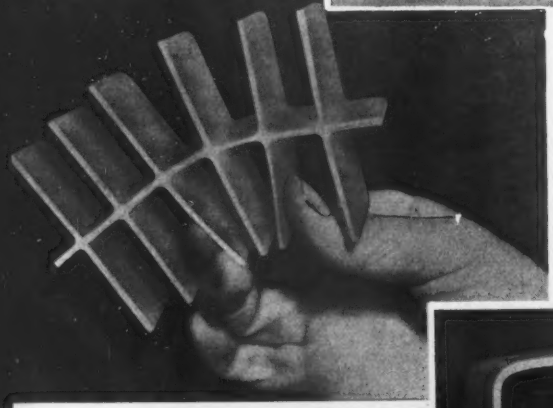
(Left) Carrier for hard-boiled eggs, in polystyrene. (Stone and Simmons.) ("Plastics," 1949/Aug./24.)

(Below) Plate rack, an example of the use of "Warerite" laminated plastics. (Warerite, Ltd.)

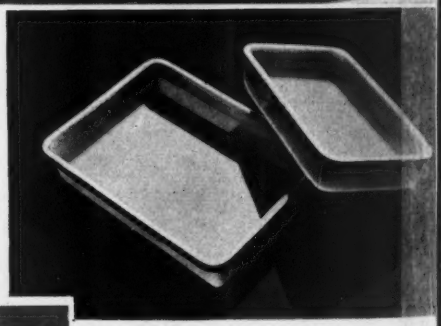


(Above) Multi-point water heater (De La Rue Gas Development, Ltd.) with plastic casing. ("Plastics," 1946/514.)

(Above) Electric iron handle in phenolic, moulded by United Ebonite and Lorival, Ltd. ("Plastics," 1947/384.)

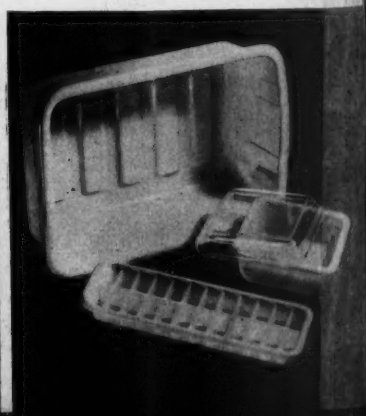


(Left) Polythene grid for ice-cube box in refrigerator, and (below) refrigerator casing in "Perspex." (Thermo-Plastics, Ltd.)



(Above) Food trays pressed from acrylic sheet. (Runcolite, Ltd.)

(Below) Refrigerator parts in "Perspex," by Thermo-Plastics, Ltd.



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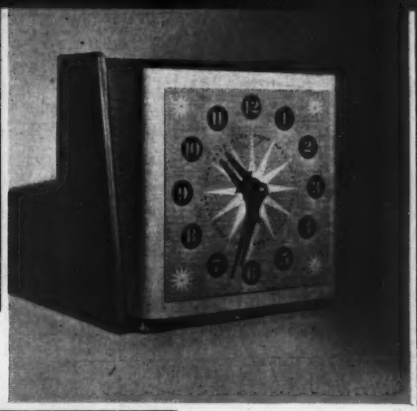
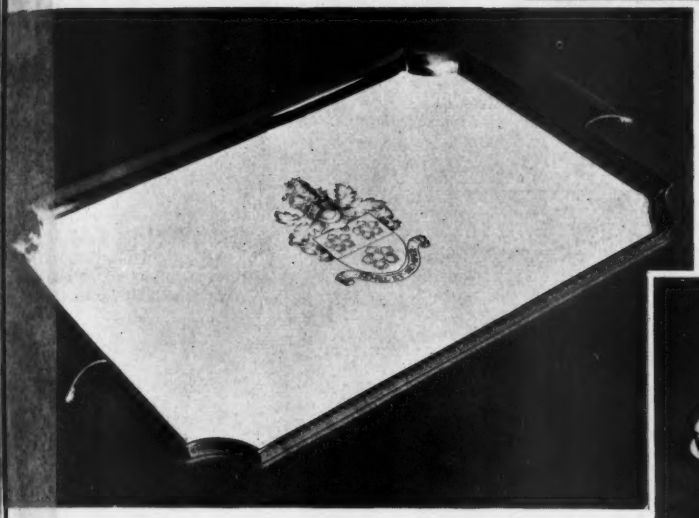
lizing p.v.c. ex-
sions by Tenaplas,
d. ("Plastics,"
1947/193.)

(Above) Grapefruit cups, engraved "Perspex." (Plastra Components Ltd.) ("Plastics," 1946/477.)

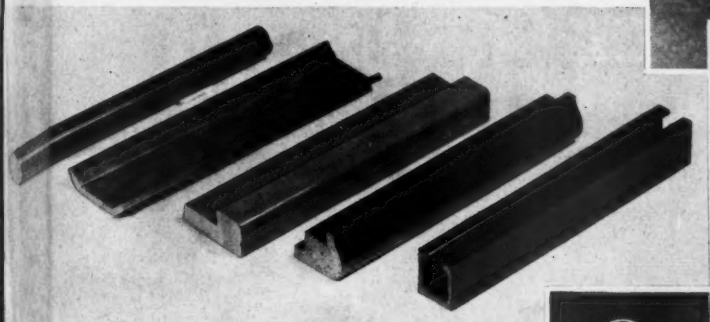


(Above) Mantelpiece clock (Baume and Co.) with interlaminate printed "Formica" face. ("Plastics," 1949/Sept./53.)

(Above) Novelty clock (Vitascope Industries, Ltd.) utilizing a range of cellulose acetate materials.

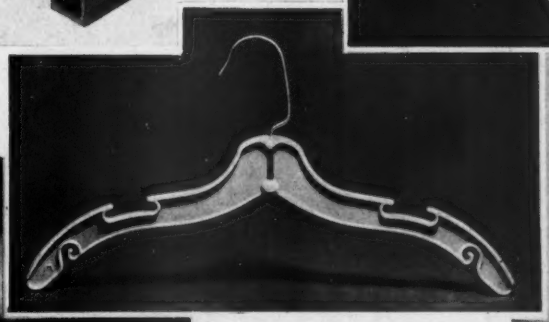


(Above) Tray with decoration as integral part of "Warerite" laminate (Warerite Ltd.) and (right) another tray utilizing "Holoplast" material. (A. F. C. Cheyham, Ltd.)

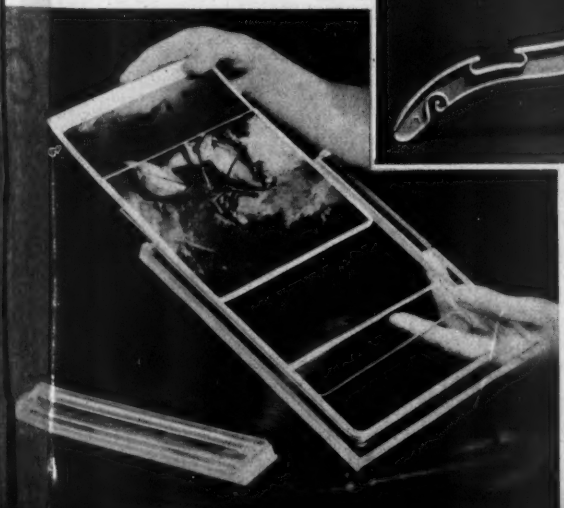


(Left) Funnel, of acid- and alkali-resisting polythene. (J. F. Kenure, Ltd.)

(Above) "Rockite" extrusions, including curtain rail channel (foremost right), by British Resin Products, Ltd.



(Above) Dress hanger in cellulose acetate, by Injection Moulders, Ltd.



(Left) Photo frame, machined from "Perspex" (J. Starkie Gardner, Ltd.)

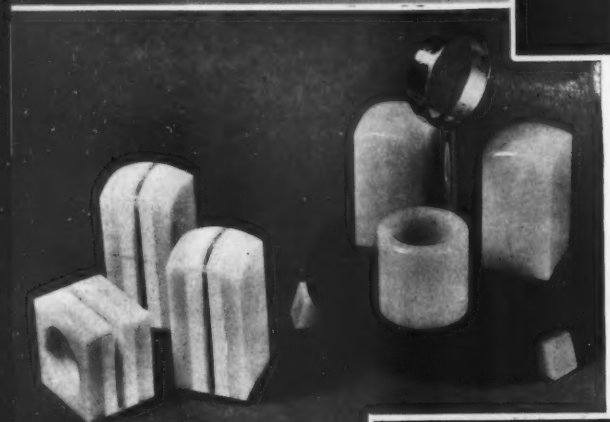
(Right) Electrically-heated bed warmer (R. A. Rothermel, Ltd.), the body moulded in "Bakelite" by Insulators, Ltd. ("Plastics," 1947/325.)

(Left) Children's table-napkin rings cut from "Catalin" rod, with "Alkathene" wheels. (Airfix Products, Ltd.)

(Right) Salt, pepper, mustard and sugar holders in "Beetleware." (Streetly Manufacturing Co., Ltd.) ("Plastics," 1947/230.)

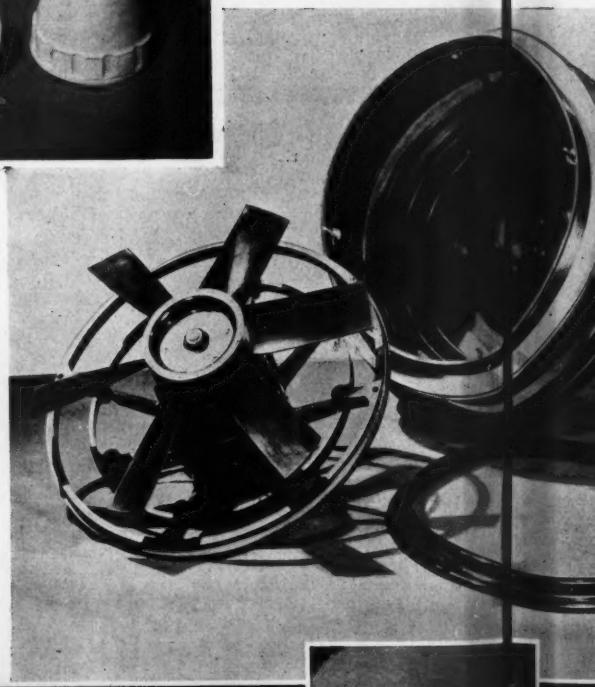
(Below) Meals tray in "Perspex" for aircraft use. (B.O.A.C.) (1947.)

(Above) Old and new compare examples of the use of plastics in place materials hitherto employed, as seen at f post-war plastics exhibition in London, v., 1946.



(Above) Polythene salt and pepper shakers. (Tamworth Plastics, Ltd.) ("Plastics," 1947/205.)

(Left) Cruets in "Perspex" and in machined cast resin. (Strong and Co., Ltd.) ("Plastics," 1949/Sept./53.)

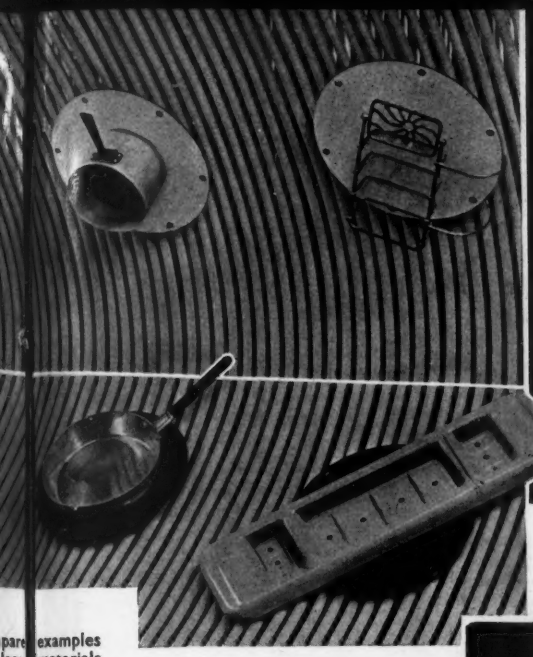


(Above) Polythene mug. (Tamworth Plastics, Ltd.) ("Plastics," 1948/485.)

(Right) Salt and pepper holders in cellulose acetate, with "press-knob" dispensing device. (Mendle Brothers, Ltd.)

(Left) Polythene beaker by Barclay-Stuart (Plastics) Ltd. ("Plastics," 1947/233.)

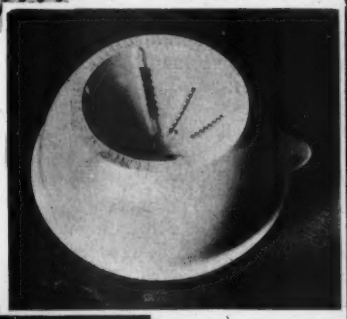
(Above) Table-nap ring in extruded p. with acrylic buck (Duratube and Wi Ltd.)



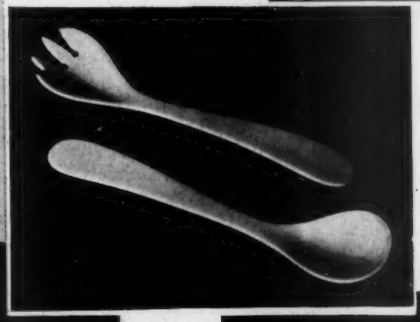
(Above) Lemon squeezer in urea by United Ebonite and Lorival, Ltd. ("Plastics," 1946/629.)

(Above) Plastic colander, with interchangeable snap-in metal strainers. (Runcolite, Ltd.)

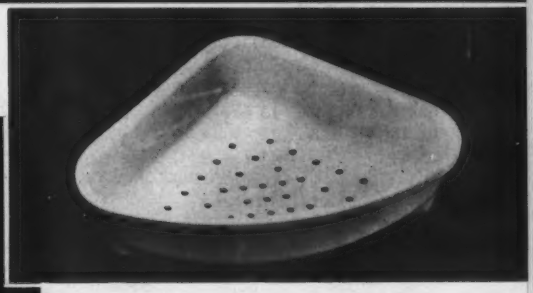
(Below) Washing-up bowl, injection moulded in polythene by Halex, Ltd. Probably the largest injection moulding yet made in Britain, weight 2 lb. ("Plastics," 1948/590.)



(Left) Moulded parts for exhaust fan (Vent-Axia, Ltd.) by British Moulded Plastics, Ltd.

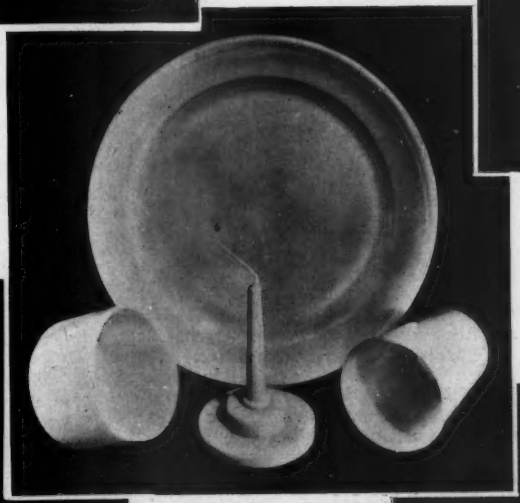


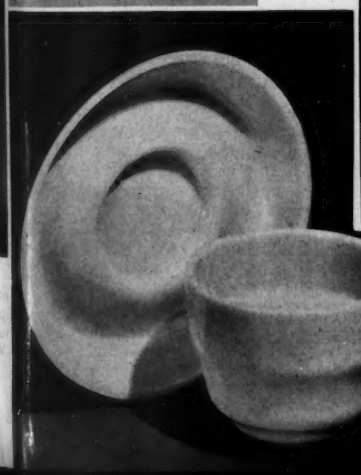
(Above) Lemon squeezer in "Beetle," with non-corroding metal inserts for grating the rind, and (left) salad servers.



(Above) Sink tidy, moulded in "Beetle" melamine by N.B. Mouldings, Ltd.

(Below) "Beetleware" beakers of unorthodox pattern. (Streetly Manufacturing Co., Ltd.) ("Plastics," 1947/148.)





(Above) Injection moulded plate, cup, and test pieces in nylon. (I.C.I., Ltd.)

(Left) "Perspex" cup and saucer by Parco Industries. ("Plastics," 1948/125.)

LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Mould Making in 1870

SIR,—Referring to your note on the moulding of a bust of Lord Kitchener ("Plastics," September, 1949, page 34), it may interest you to know that our business was started in the year 1870, when moulds were made for casting wax and metal figures for the electro-plate and holloware manufacturers of Sheffield. The late Mr. W. B. Coldwell, whose indentures we still have, dated 1881, and books dating back to 1886, was regularly making brass moulds for this type of work. Dies were made of cast iron for holloware stamping, and steel moulds for moulding the natural organic horn handles and scales used by the cutlery trade. The late Mr. C. B. Coldwell was awarded the National Bronze Medal, together with Diploma, for die sinking in 1911, and we still have men capable of doing this class of work in our employment.

W. B. COLDWELL AND SONS, LTD.
89-91, Rockingham Lane,
Sheffield, 1.

New Plasticizers

Sir,—With reference to the article entitled "The Search for New Plasticizers," in the August issue of "Plastics," we are interested in "alkyl aryl phosphate being manufactured" (as mentioned on page 26) in connection with plasticizers for p.v.c. We would be grateful if you could let us know from whom we could obtain samples, and further information about this plasticizer.

We would also like similar information regarding the manufacturers of "acetyl trihexyl citrate" and "2-ethyl hexyl ester of azelaic acid," mentioned on page 27.

BRITISH BELTING AND ASBESTOS, LTD.
Cleckheaton, Yorks.

[EDITOR'S NOTE: Manufacturers of alkyl aryl phosphate are Monsanto Chemicals, Ltd., and Albright and Wilson, Ltd.; British Industrial Solvents, Ltd., and A. Boake Roberts and Co., Ltd., should be approached for the citrates and azelates.]

Adhesives

Sir,—Some months ago, possibly in 1948, you published an article concerning an adhesive for cementing metal, glass, or wood to wood. So far as can be remembered, the adhesive consisted of a cement and a powder accelerator, and the joint could be cured either at an elevated temperature or at room temperature, with the addition of extra proportions of accelerator.

The article was illustrated with pictures of show-cases, a tennis racket, and wood-to-metal joints. The text emphasized the improved mechanical strength of the joint, compared with conventional screwed or glued methods. Would you kindly inform me of the suppliers of this material. JOHN F. NORWOOD.
Kempton,
Hitchin, Herts.

[EDITOR'S NOTE: The article in question was published in the issue of "Plastics" for June, 1948 (page 304). The adhesive is supplied by Aero Research Ltd., Duxford, Cambridge.]

New Polymer Solutions

Sir,—We note the information relative to polystyrene solutions of high solid content in the article "New Polymer Solutions," in the August issue of "Plastics." We wonder if you are able to inform us of a source of further available information concerning these materials. Also, are these materials available commercially?
Easton, Pa., DIXIE CUP CO.
U.S.A.

Sir,—In "Plastics" for August, 1949 (page 6), there is reference to the commercial applications of polybutyl methacrylate. Could you advise us whether this material is available in the United Kingdom?

T. J. SMITH AND NEPHEW, LTD.
Neptune Street,
Hull.

[EDITOR'S NOTE: Further information on the products referred to in the above two letters can be obtained from Vinyl Products, Ltd., Butter Hill, Carshalton, Surrey.]

Bathroom Walls

Sir,—I have been reading your August issue and noting some of the various uses to which plastics can be put. Could you advise me as to their suitability in sheet form for covering the walls of bathrooms, or would the steam cause any warping or otherwise affect the material? Could such material also be used as a covering for walls which have become disfigured by damp rising through the foundations? I should be interested to know which types of plastic would be satisfactory. R. C. SORRELL.
39, Friars Gate,
Leicester.

[EDITOR'S NOTE: There are various laminates, such as "Warerite" (Warerite, Ltd., Ware, Herts) and "Formica" (De La Rue Insulation, Ltd., 84-6, Regent Street, London, W.1), which provide suitable material for covering walls. In our issue of January, 1947, we reproduced an illustration in colour (facing page 16) of a bathroom utilizing laminate as a wall surface. Polystyrene tiles of colourful appearance and highly polished surface, likewise unaffected by moisture and soap, are also available. A bathroom making use of these tiles (Stone and Simmons, Ltd., 73-5, Mortimer Street, London, W.1) has also been illustrated (June, 1948, page 285). There are other suppliers of polystyrene tiles, such as Don-Tyle, Ltd., Thorne, near Doncaster. See also "Plastics," June, 1948 (page 289) for a further example of the use of laminate (North British Plastics, Ltd., Blaydon-on-Tyne).]

Finger-control Knobs

Sir,—We are requiring a number of finger-control knobs in plastic for fitting to ¼-in. diameter spindles. As this application involves only a small number, say 2,000, we would like to contact any firms who mould such articles as a standard line. VICTOR H. IDDON, LTD.
Harper Road,
Wythenshawe, Manchester.

Bobbins

Sir,—We shall be glad to contact the manufacturers of plastic bobbins for sewing yarn. Quantities required for export to cotton mills in the East would amount to about 500,000 pieces per year.

M. R. DIETHELM.
40, Chepstow Street,
Manchester, 1.

Extrusions in Cellulose Acetate

Sir,—Can you help by putting us in touch with a firm having extrusion capacities for tubes 8 mm. O.D. and .040 mm. I.D. in cellulose acetate?

IRENE MANUFACTURING CO., LTD.
Stanhope House,
Kean Street, London, W.C.2.

Darners

Sir,—At one time we bought plastic darners from a source which is no longer available. Can you give us names and addresses of any other manufacturers?

V. M. GLYNN, LTD.
Coventry House,
South Place, London, E.C.2.

Casein Buttons

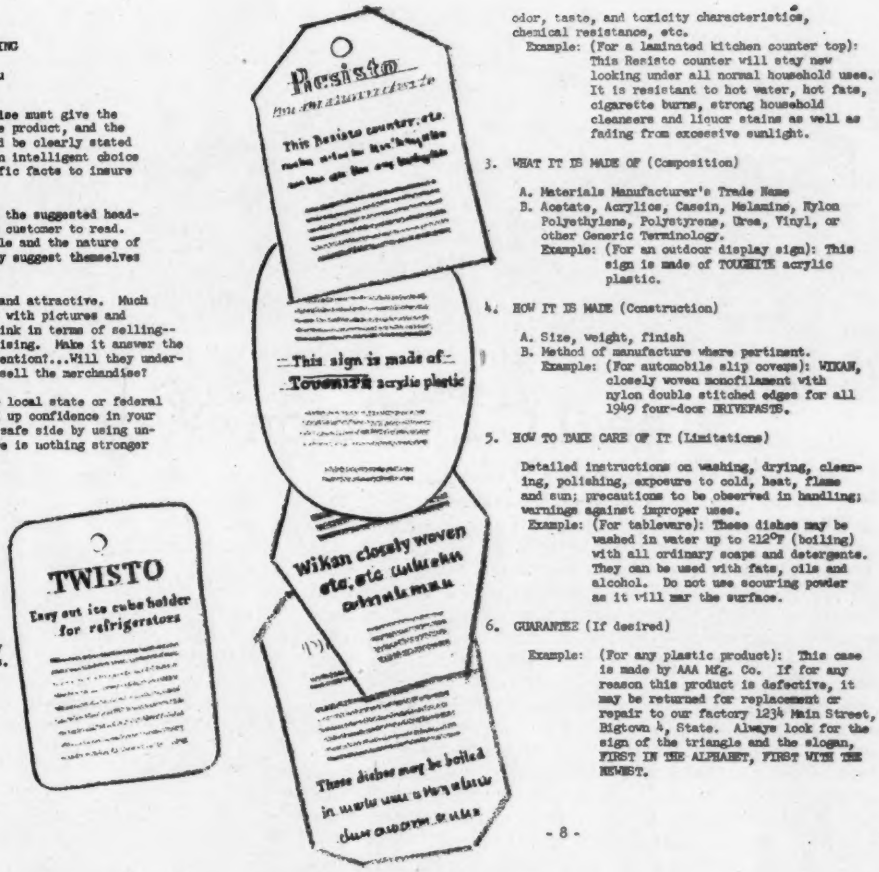
SIR,—In your September issue (page 50) there is a statement by Mr. Vivian Stannett reading as follows:—"Highly decorative casein buttons are very popular, but suffer from the disadvantage that they stand up to repeated laundering less well than cellulose acetate."

This statement is wrong, because the actual position is just the other way round. Good quality casein buttons will stand up much better—particularly to treating with pressing irons—than do buttons made of cellulose acetate.

GANSOLITE BUTTONS, LTD.
York.

[MR. STANNETT replies:—"I agree that casein buttons stand up better to hot ironing, but owing to their poor water resistance they stand up less well to the usually drastic laundering than cellulose acetate. This is the generally held opinion in the trade in the United States—see, for example, "Modern Plastics," April, 1948, page 94. Maybe the laundries are more severe over here in the U.S.A.!"]

(*Letters continued on page* 82.)



THE PLAN FOR INFORMATIVE LABELING

How To Make It Work For You

The facts about any item of plastics merchandise must give the customer a definite idea of the quality of the product, and the important details. The key information should be clearly stated in simple terms to enable the buyer to make an intelligent choice through comparison of quality. Further specific facts to insure proper care and use should also be provided.

It is desirable to group the facts used under the suggested headings shown, as it will make it easier for the customer to read. However, depending on the nature of the article and the nature of the information furnished, other groupings may suggest themselves to you.

Your informative labeling should be colorful and attractive. Much of the required information can be made clear with pictures and diagrams. When having the label designed, think in terms of selling--judge it the way you'd judge a page of advertising. Make it answer the questions--Will it attract the customer's attention?...Will they understand it quickly and easily?... Will it help sell the merchandise?

All information should, of course, conform to local state or federal regulations, where such exist. You can build up confidence in your product by avoiding exaggeration. Be on the safe side by using understatement rather than overstatement. There is nothing stronger than a well-stated truth.

x I x

1. WHAT IT IS (Uses)

Product name, application, etc.
Example: (For a molded Ice Tray): TWISTO, easy out ice cube holder for refrigerators.

If industry standards are available for the products you manufacture, by all means refer to your product's conformity with these particular industry standards.

2. WHAT IT WILL DO (Performance)

Flexibility, color permanence, transparency, light carrying properties, rigidity, heat or scratch resistance, odor, taste, and toxicity characteristics, chemical resistance, etc.
Example: (For a laminated kitchen counter top): This Resisto counter will stay new looking under all normal household uses. It is resistant to hot water, hot fats, cigarette burns, strong household cleansers and liquor stains as well as fading from excessive sunlight.

3. WHAT IT IS MADE OF (Composition)

A. Materials Manufacturer's Trade Name
B. Acetate, Acrylics, Casein, Melamine, Nylon Polyethylene, Polystyrene, Urea, Vinyl, or other Generic Terminology.
Example: (For an outdoor display sign): This sign is made of TOUCHITE acrylic plastic.

4. HOW IT IS MADE (Construction)

A. Size, weight, finish
B. Method of manufacture where pertinent.
Example: (For automobile slip covers): WIKAN, closely woven monofilament with nylon double stitched edges for all 1949 four-door DRIVEPASTE.

5. HOW TO TAKE CARE OF IT (Limitations)

Detailed instructions on washing, drying, cleaning, polishing, exposure to cold, heat, flame and sun; precautions to be observed in handling; warnings against improper uses.
Example: (For tableware): These dishes may be washed in water up to 212°F (boiling) with all ordinary soaps and detergents. They can be used with fats, oils and alcohol. Do not use scouring powder as it will mar the surface.

6. GUARANTEE (If desired)

Example: (For any plastic product): This case is made by AAA Mfg. Co. If for any reason this product is defective, it may be returned for replacement or repair to our factory 1234 Main Street, Bigtown 4, State. Always look for the sign of the triangle and the slogan, FIRST IN THE ALPHABET, FIRST WITH THE NEWEST.

- 7 -

- 8 -

Informative Labelling

Herein is discussed the work of the Society of the Plastics Industry, U.S.A., in promoting the sale of high-quality plastics to the public. The above examples have been photographed from the original printed programme, by kind permission.

AT the annual business meeting of the Society of the Plastics Industry, U.S.A., at Chicago earlier this year, the Informative Labelling Committee presented its programme. Prior to its presentation, the chairman of the Committee, Mr. Elmer French, general sales manager, Firestone Plastics Co., delivered an address in introduction. He described briefly that the functions of the programme are:—

(1) To create greater co-ordination of "end-product" uses and help to meet requirements of users.

(2) To permit the customer to distinguish quality products.

(3) To impart to the public key facts about the product.

(4) To emphasize the positive characteristics of the product in its specific use.

(5) To educate consumers by differentiation between plastics and other materials, between plastics themselves, and what may be expected of each.

(6) To teach the customer about newly developed plastics.

The programme itself is the result of an enormous amount of work by sub-committees, involving terminology, standardization and testing, controls, etc., and yet it is a guide only and neither interferes with the free enterprise of each member nor with his own labelling plan.

Mr. French concluded his remarks by emphasizing the need for the programme in connection with "to-morrow's marketing needs," for inferior goods have confused the buyer. He will, in fact, welcome help in making his choice, and the purveyor of goods who makes it easy to judge quality or use is the one who will stand the better chance of landing the order. The programme itself sets out the reason for its creation. It is clear that the rapid growth of the plastics industry and the appearance of many new materials makes it difficult for consumers to keep pace with events. They know the limitations of traditional materials. They do not know those of plastics.

Taken all in all, the programme supplements merchandizing by saving time in shopping, lessens the need for return, reduces misunderstandings, and increases appreciation of quality; it improves customer relations, including more intelligent sales by "clerks"; increases the effectiveness of advertising; and finally benefits retailer, consumer and the entire industry.

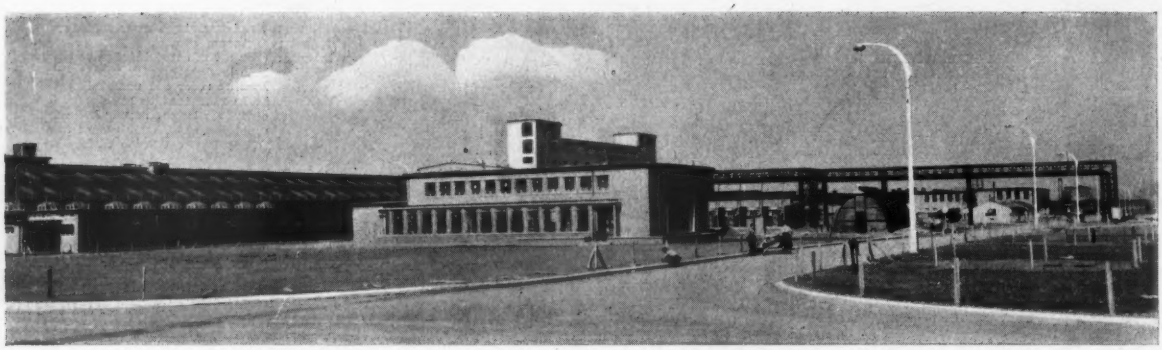
The programme outlines a suggested plan, which, with the kind permission of the Society of the Plastics Industry, we reproduce herewith and which is self-explanatory.

There is one point which is one for argument. We refer to the description under the heading, "What it is made of." We queried the advisability of thrusting upon the public a set of chemical names whose meaning the general public can hardly understand.

We wrote Mr. Langdon Williams, director of public relations, S.P.I., for the Committee's reasons for their inclusion, and received the following reply:—

"The Committee feels that by mentioning the names of the different plastic materials with the word 'plastic,' and, where

(*Continued on page* 88)



The "Perspex" plant, and workers' canteen adjoining.

The I.C.I. Wilton Works Begin

LAST year we first made mention of the great new plants of Imperial Chemical Industries, Ltd., that were being built at Wilton, near Middlesbrough. On September 14 last, the opening ceremony was carried out by Lord McGowan, K.B.E. It was a ceremony of outstanding importance, not only to the plastics industry, but also to the whole of the chemical industry of which it is now such an important part. In these works we see reflected the tremendous stride forward taken by a large section of the plastics industry and the promise of even greater things.

When I.C.I. bought a tract of 2,000 acres upon which to build Wilton Works, its intention was to provide a site that would accommodate a large part of the company's major developments for many years to come. These developments include not only additional plant for products already well established, but the manufacture in quantity of some of the newer products invented in more recent years.

It is a little over three years since work was started on the Wilton site, and the first two plants are now in production, namely those for phenolic resins and "Perspex."

Phenolic Resins

Phenol-formaldehyde moulding powders were first manufactured within I.C.I. when, in 1933, they acquired a controlling interest in Croydon Mouldrite, Ltd. The cramped and unsatisfactory nature of the site at Croydon and the increasing market for these products made it desirable to erect a new factory away from the Croydon site. The outbreak of war resulted in a deferring of these plans until recently. The Wilton plant embodies the latest developments in resin and moulding powder manufacture and makes full use of automatic control and mechanized handling to produce high-grade powders of consistent quality.

When designing the plant, prime importance was attached to the elimination of the possibility of dust explosions, which may occur with finely divided powders. The dust-handling equipment, enclosed conveyor systems and special storage bunkers are particular features of the plant ensuring safe operation and good working conditions.

Now that the Croydon plant is being closed down, as many as possible of the staff and workers have been transferred to Wilton, where they will enjoy these improved working conditions. It is important to note that "urea" resins will also be made at Wilton.

"Perspex" Plant

The process used on the Wilton "Perspex" plant is essentially that operated at the older Billingham and Darwen (Lancashire) factories, but incorporates the latest developments in mechanical and automatic control with the object of improving still further the efficiency and productivity of this manufacture.

The starting material in the manufacture of "Perspex" is the monomer methyl methacrylate, made by the General Chemicals Division of I.C.I., the nearest plant being at Billingham Works. The methyl methacrylate is first partially polymerized by heating in presence of a catalyst and, where coloured sheet is required, pigments are incorporated at this stage. This syrup is poured into a mould formed by two glass plates and a flexible gasket, the gasket diameter and weight of syrup depending upon the thickness of final sheet required. The gasket is of sufficient flexibility to take up the large contraction which occurs during polymerization. The casting chamber is kept under a slight positive pressure with filtered air. This ensures freedom from dust in the air, which might contaminate the product at this vital stage.

The filled moulds are mechanically loaded on to trucks, which then pass to an automatically operated and controlled oven. At the end of this stage of the process the glass adheres tightly to the "Perspex" sheet, and a special stripping operation is necessary to facilitate separation. This operation is also automatically controlled, and the times and temperatures used in both the polymerization and stripping processes are chosen to suit thickness and type of sheet being produced.

On removal from the stripping ovens, the glass moulds are mechanically unloaded from the trucks and the "Perspex" sheets removed. The glass is then again in position for mechanical washing and re-use.

Each "Perspex" sheet is individually examined for contamination, distortion and colour, and subjected to a variety of quality control tests to ensure that the quality is of the high standard required for the many applications.

Polythene Production

A fourth plastic material will be produced in the first stage of Wilton's programme. This is polythene, the plastic whose unique electrical properties were of such value during the war in the development of radar. This plastic has many other valuable properties, and new uses for it are being steadily expanded.

The raw material for polythene is ethylene, which is one of the products of the Wilton oil-cracking plant. The large oil tanks and towering steel structure of this plant are already features of the Wilton landscape.

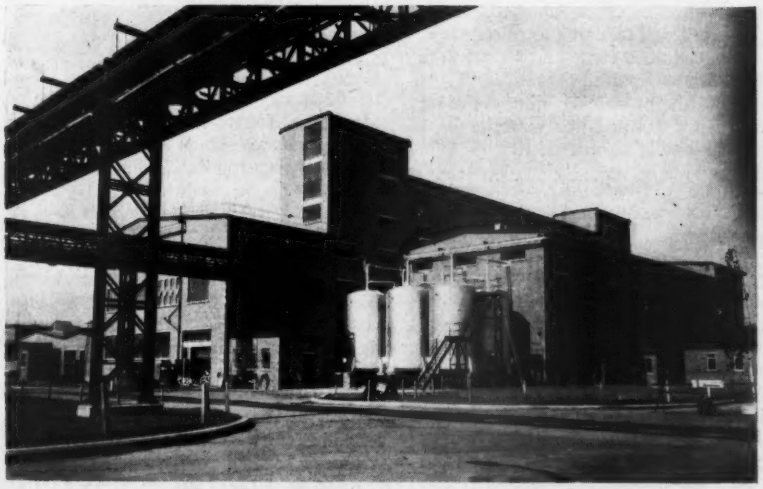
Oil will be received from ocean-going tankers at the new berths being constructed at Teesport by the Tees Conservancy Commission. Hundreds of tons a day will be cracked in order to obtain the simple hydrocarbon gases from which the more complex organic chemicals are built up. For the present, the two most important of these gases are ethylene and propylene. From the former, Wilton will make not only the polythene mentioned above, but synthetic washing agents (detergents) and antifreeze. From propylene will be derived the important material acetone, which is widely used as a paint solvent and also forms one of the raw materials for "Perspex."

Official Opening of New Works for I.C.I. at Wilton

Horton spheres for the bulk storage of ethylene, one of the products of the oil-cracking plant, part of which will go to the production of polythene.

Main intersection of communications, with steelwork for parts of the plant in course of erection in background.

(Left to right) Mr. F. T. Woolner, production director of Plastics Division; Lord McGowan; and Dr. J. W. Armit, chairman of I.C.I. Wilton Council.



General view of the phenolic moulding powder plant.

(Left to right) Mr. P. C. Allen, chairman of I.C.I. Plastics Division; Dr. W. J. Worboys and Sir Ewart Smith, directors of I.C.I.

Marking Processes and Media—VII

By E. E. HALLS

In this instalment the author treats of "pasters" and paper labels as a means of marking plastic manufactures, and gives useful information upon the types of adhesive which may be employed. Tests on the deterioration of paper labels under humid conditions are also reported.

ALTHOUGH it may appear surprising at first sight, the simple procedure of marking with pasters or paper labels is extensively employed. On electrical equipments, the wiring diagram or schematic is often provided as a drawing such as a blue or dye-line print, and this is fixed permanently to the apparatus by cementing to a panel of phenolic laminated (paper or fabric) sheet. Relay coils have their numerous markings applied to the end-cheeks which again may be phenolic paper or fabric laminated, or they may be phenolic thermosetting mouldings, the markings being printed on a paper slip. The printing is done actually in the coil winding shop to the requirements of the work passing through, as this usually comprises a wide variety of codes of otherwise closely similar coils, so that it is a question of printing small quantities of specific markings.

For fixing these paper markings, numerous types of adhesive are employed satisfactorily. The paper base may vary appreciably, from an absorbent quality of thickness from 0.00175 in. to 0.0030 in. in distinctive colours, white, green, red, etc., for small coils, to heavier 0.0035 in., to 0.0050 in. drawing paper for schematics. In the first class, the cement used in fixing must not affect the colour of the label by bleaching it, or by staining through to obliterate the marking or to render it illegible. In the second class, the ferroprussiate, dye-line, or other type of print must not be adversely affected.

For the larger schematics, fixed to S.R.B.P. or F. sheet or panelling, high-grade liquid fish glue and selected qualities or ordinary paper-hanger's paste are satisfactorily employed. Success with such simple adhesives may come as a surprise. The adhesive is applied by brush to the panel or to the paster, and the latter is laid in position and evened-out by pressing firmly by means of a roller. Excess of paste is carefully wiped clean, a period for drying is allowed, and then the surface is coated with a brushing lacquer of nitro-cellulose base. The latter is either taken over the entire surface of the phenolic laminated sheet, or to extend over the edge of the paster by at least a quarter of an inch, this margin ensuring resistance to dampness. A period of 12 hours or so is allowed for full-drying of the lacquered surface.

What may be regarded as a universal type of stickant for paper to thermosetting plastics, is a Bakelite/rubber adhesive with the following characteristics:—

Total solids (3 hrs. at 110°C)	15.0%
Volatile spirit	85.0%
	100.0%
Viscosity @ 25°C (centipoises)	280
Sp. gr. @ 25°C	0.835
Drying time: Surface	15 mins.
Hard	4 hours

A thin brush application of this material is made on the surface concerned, a period of one to two minutes is allowed for the cement to become tacky, and then the label or paster is applied. It is smoothed with hand pressure through a layer of cloth, and permitted 30 minutes for drying. A coat of topping lacquer of nitro-cellulose base is then applied. A fixing of this nature is naturally serviceable under more severe conditions of humidity and condensation.

A third method for large pasters is a compromise between the previous two procedures. The stickant is a 50/50 mixture of a dextrine "photo-mounting" paste and a nitro-cellulose cement, compounded as required in a small mixing machine. This is applied to the base material, the paster applied, allowed to dry, and given an over-coating or lacquer as above.

Nitro-cellulose Cements

Ordinary nitro-cellulose cements are not always successful in fixing paper to thermosetting plastics because of their shrinkage characteristics. Contraction may be delayed for a period of days or even weeks, presumably till retained solvent has practically all evaporated. The paper then becomes detached. However, it is quite practicable to select clear, colourless cellulose cements that are free from this shortcoming.

One of these special nitro-cellulose adhesives is a lacquer-like material having the following characteristics:—

Total solids (3 hours @ 110°C)	11.0%
Volatile spirit	89.0%
	100.0%
Sp. gr. @ 25°C	0.887
Viscosity at 25°C (centipoises)	332

Special thinners are used for adjusting this to the right consistency for application. They are free from hydrocarbons, and comprise a mixture of approximately 27 per cent. butyl acetate, 12 per cent. butyl alcohol, and 61 per cent. methyl ethyl ketone, the specific gravity at 25 degrees C. being 0.827. The boiling range of the mixture is as follows:—

From 60 to 80°C	68% by volume
From 80 to 90°C	11% by volume
From 90 to 120°C	21% by volume

The cellulose adhesive just referred to is applied by brush or spray to the reverse side of the paster and allowed a minute or two in which to dry. A second coat is then similarly given, and the paster is immediately placed in position, pressed down firmly with particular reference to the smoothing down of edges. After a suitable drying period, for which in general two hours suffices, an over-coat of the same adhesive material is applied by brush or spray. Handling is possible in about half-an-hour, but 24 hours is necessary for complete drying. The nature of the solvents and the rate of drying of the adhesive are largely contributory to the success of this process. For small labels or pasters, brush application is employed, whereas for large ones the spray method is utilized.

Often a compromise is effected by appropriate thinning of a heavy nitro-cellulose cement. Thus a standard material of the following type can be used as the basis:—

Nitro-cellulose base (3 hrs. @ 110°C)	22.5%
Volatile spirit	77.5%
	100.0%
Viscosity @ 25°C (centipoises)	Greater than 15,000
Sp. gr. @ 25°C	0.900

This is diluted with butyl acetate or amyl acetate to the extent of 15 to 25 per cent. to give a product of the following characteristics:—

	Min.	Max.
Total solids %	15.0	17.0
Volatile spirit %	83.0	85.0
Viscosity at 25°C (centipoises)	6,000	10,000

This material is applied by brush, usually to the base material and not to the paster. For small labels, the same material is brushed over the surface after fixing, but for larger surfaces a thinner nitro-cellulose top lacquer may be used.

Yet another alternative is to use a solution of virgin nitro-cellulose scrap in solvent, quite a range being practicable, the following being representative:—

	(1)	(2)	(3)
Celluloid scrap (high viscosity) % by wt.	10	25	10
Acetone	90	75	45
Amyl or butyl acetate	Nil	Nil	45
	100	100	100

In these formulations, butyl alcohol may be used to replace up to 10 per cent. of the solvent or mixed solvents.

Polyvinyl Solutions

Polyvinyl adhesive solutions of the acetate or acetal varieties are also very effective for the fixing of paper markings, again using the same material or a cellulose composition for the top lacquer. The adhesive is brush applied to the back of the paper, which is immediately pressed firmly into position. After two hours air-drying, the cellulose top lacquer is applied, by brush on small areas and by spray over large surfaces. Then 30 mins. is allowed before handling and 24 hours before regarding as fully dried.

Characteristics of a typical polyvinyl adhesive solution are given below:—

Total solids (3 hrs. @ 110°C)	24.5%
Volatile spirit	75.5%
	100.0%
Viscosity @ 25°C (centipoises)	780
Sp. gr. @ 25°C	0.914

Rubber Latex Adhesives

Special rubber latex base adhesives are also available for this purpose, and they, too, give very good results. They, too, are applied by brush, and a final coating of topping lacquer is given in the usual way. Incidentally, this adhesive is perhaps the easiest of the series to apply, and is applicable to any of the plastics (polythene excepted). It is slightly alkaline in reaction (ammoniacal) and is therefore corrosive to non-ferrous metals such as brass, copper, nickel silver, etc. Care must be taken, in consequence, to avoid contacting metal inserts (if any) with it, and to prevent handling on to metal portions of the equipment when being used.

Another convenient rapid air drying group of cements that is obtainable are the methyl methacrylate base adhesives. This class of material can be satisfactorily employed for the present purpose, and one member of the range that yields very good adhesion of paper to thermosetting plastics shows the following characteristics:—

Methyl methacrylate resin base	21.3%
Volatile spirit	78.7%
	100.0%
Drying time (hard)	10 mins.
Nature of volatile spirit:	
Boiling point	82°C approx.
Sp. gr. @ 25°C	1.246
Nature	Chlorinated hydrocarbon
Type	Ethylene dichloride

This material is very rapid drying and, therefore, speedy working is necessary when brushing over the label. The same material can be used for the top lacquer, or a cellulose coating can be given.

Tests Under Damp Conditions

Paper is very water absorbent, and under damp conditions some deterioration of pasters must be expected. All the foregoing processes applied to phenolic paper and fabric laminated sheets have been tested under moderately severe cyclic test conditions as follows: Daily cycle consisting of eight hours at 55-60 degrees C., with humidity of 65-70 per cent., then cooling off to atmospheric temperature with rise in humidity to 100 per cent. and condensation of water upon the specimens. Total test period, three weeks (21 cycles).

Specimens with and without top lacquer were examined. Before test, those without the protective lacquer could be marred at the edges when scraped hard with the thumb nail; those with lacquer could not be damaged in this way. After the test period of three weeks, no deterioration showed in any sample, except the unlacquered samples, representing paperhanger's paste and liquid glue, which became softened and could be scraped off.

A more searching exposure test was also used, being applied to the lacquered samples after the humidity test. This comprised a dry cycle of eight hours at 70 degrees C., followed by two wet cycles. Each of the latter consisted of eight hours at 60 degrees C. and 100 per cent. humidity, followed by 16 hours cooling off in the test cabinet. No deterioration occurred in the dry cycle, but in the wet cycles, both first and second, the paper became sodden with moisture. Examination was, therefore, made at intervals of half, two and 24 hours from the conclusion of the test. For all specimens coated with top lacquer, the primary adhesive consisting of the material named, the results obtained were as shown in Table 1.

Table 1.—Tests on Adhesives.

Adhesive	Tested after		
	½ hr.	2 hrs.	24 hrs.
Paperhanger's paste or liquid glue	Poor	Poor	Fair
Bakelite/rubber	Fairly good	Fairly good	Excellent
Dextrine/nitro-cellulose	Fair	Fairly good	Fairly good
Special nitro-cellulose	Fairly good	Very good	Excellent
Polyvinyl acetal	Very good	Excellent	Excellent
Rubber latex	Fairly good	Good	Good
Methyl methacrylate	Fair	Good	Very good

For securing pasters to the thermoplastics, an appropriate thermoplastic resin solution or solvent only is advocated. For methyl methacrylate, the adhesive of the same base as already noted above is used. For cellulose acetate, a nitro-cellulose adhesive having a preponderance of acetate solvent such as acetone or diacetone alcohol in its make-up is required. For polyvinyl chloride, a special proprietary adhesive is used.

Paper labels can be printed on heat-fixing base materials, viz, a paper coated on one side with thermoplastic resin. Shellac, polyvinyl acetal and gutta-percha are examples of the latter. For application to the thermosetting plastics in the form of phenolic laminated, or phenolic or amino mouldings, the surfaces of which are hard and usually smooth, the temperature conditions for heat fixing have to be very nicely determined, and the face of the hot pressing device needs to have a layer of compressible cushioning material in order to take care of surface inequalities. The gutta-percha coating responds most easily of the three types mentioned. Generally, however, the same success with respect to good adhesion for long service is not obtained as is derived when using a separate adhesive.

(To be continued.)

Precautions in Use of Tricresyl Phosphate

TECHNICAL tricresyl phosphate as used in the plastics industry is a mixture of phosphoric acid esters with more or less high amounts of o-tricresyl phosphate. About the poisonous nature of the latter substance there cannot be any doubt. Used extensively as plasticizer for polyvinyl chloride, it gives products of good heat resistance, high mechanical properties, and complete absence of smell. It is also particularly valued for the production of plastic foils.

In a recent contribution to "Kunststoffe," (1949/Mar./65) Dr. H. Berger investigates measures to prevent impairing the health of persons coming into contact with materials which have been plasticized with technical grades of tricresyl phosphate. He distinguishes between plasticizers employed for articles of general use ("gebrauchsgegenstände") and those which are likely to come into contact with foodstuffs. In 1945, when the former I.G. Farbenindustrie issued special recommendations regarding the use of plasticizers in the production of plastics, it was stated that in all cases of possible contact with foodstuffs technical tricresyl phosphate should not be used. With regard to articles coming in contact with the human skin, the technical grade of tricresyl phosphate should be used only for articles with a purely technical purpose if no more important objections were raised.

Regarding the production of toys, this plasticizer should not be employed when materials are ultimately used in making dolls, nor for articles which are likely to contact the mouth, such as "suckers," teething rings, etc. Against the use of technical tricresyl phosphate in the production of shoes, which do not usually come in direct contact with the skin, no objections exist; however, for the production of artificial limbs this plasticizer should be excluded completely. It is stated, moreover, that polyvinyl chloride itself is not damaging to the health of the person contacting it.

There appeared to be no objections raised against the I.G. product "Vinidur," made on "Igelit" basis (vinyl polymer without filler, not hardenable). Soft rubber-like products of polyvinyl chloride, however, contain plasticizers, dyes, and fillers, and it depends on the type of these additions as to whether the end product is or is not damaging to health.

How Would You Pack It?

THE bottle here shown is a glass chemical bottle, common enough and used for sending samples of liquid from the chemical manufacturers to the potential customers. Even to those who are unaware of this common practice, it will be obvious that liquids sent in glass bottles should be carefully packed to avoid breakage. This is necessary not only to prevent breakage of the glass and thus prevent waste but also to prevent that breakage and spillage harming persons or contaminating other packages with which it may be in close proximity. Thus acids, strong alkalis, poisons, and inflammable compounds must not only be clearly marked but they must also be packed in a suitable manner—that is, an absorbent material such as sawdust, chalk and the like be tightly inserted round the glass bottle in its outer casing, to absorb the liquid if the bottle be broken.

The liquid in the bottle shown is neither corrosive nor inflammable. It is ethyl hexoic acid, a new organic acid that has appeared on the market as a result of petroleum cracking and which it is hoped will be used for the production of metal combinations of it. Despite its relatively harmless nature, it is obvious that care must be taken to ensure safe delivery—besides, the contents are valued at about 3s. per lb. in such small lots. Thus packaging must be assured, almost as if it were a dangerous chemical.

The present method of packaging is one of the most sensible we have yet seen, for it avoids the tedious and time-consuming method of packing sawdust around a bottle. It consists of the use of a "sarcophagus," if we may so call it, a moulded body of wood waste bonded with resin, the result being a cheaply and rapidly constructed form that is very light and also absorbent. The bottle fits snugly and tightly into the two halves of this moulded body. Obviously it has been made for the job and within reason any size is possible.

The new package is manufactured by the Pontefract Box Co., Ltd., a concern that deserves great commendation by the chemical industry (and, indeed, many others) for relieving it of one of the bottle-necks that has beset it for many years—it has introduced an ultra-rapid method and the avoidance of the most costly and most niggling forms of packaging known to industry.

LETTERS TO THE EDITOR

(*Continued from page 76.*)

Snowstorm Toy

Sir,—We have been very interested in your correspondence concerning the "Snowstorm" toy.

We are bringing out many varieties of this within a few weeks and should be glad to know if you can recommend any particular kind of "snow" which would avoid the difficulties you mentioned in the current issue, that of falling rather too quickly.

PROJECTS (COVENTRY), LTD.
Rockland Works,
Eagle Street, Coventry.

[EDITOR'S NOTE: Without knowing much about this deep problem, we suggest that, in general, the finer the particle the slower the fall, especially if the particles be of sawdust—e.g., "Perspex," etc. However, if this cannot be controlled it may be simpler to increase the specific gravity of the water by adding glycerine or a water-soluble salt. Obviously a "snow" can also be made from a saturated salt solution by the addition of more salt; there are, of course, numerous alternatives.]

Embedding Insect Specimens

Sir,—Could you give me the name of any firm who could supply me with a small amount of unpolymerized methyl methacrylate? I wish to make a few experiments in setting insets in blocks of plastic, and in connection with my lectures on horticultural pests I am looking for a method of preparing permanent specimens.

T. E. FLETCHER.
50, Russell Avenue,
Wollaton, Nottingham.

[EDITOR'S NOTE: I.C.I., Plastics Division, Welwyn Garden City, Herts, will provide your need of unpolymerized methyl methacrylate, and also assist regarding its use. "Marco" resins, supplied by Scott Bader and Co., Ltd., Wollaston, Northants, are also being used for the purpose mentioned; their Technical Leaflet No. 9 gives some notes on the technique employed.]

Printing on Cellulose Acetate

Sir,—Replying to the letter of British United Shoe Machinery Co. ("Plastics," August, 1949, p.30), printing on non-porous, non-resilient material can be done by using rubber stereo printing plates. If the material varies in thickness it is usual to mount the rubber die on a sponge cushion. Lorilleux and Bolton, Ltd., Ashley Road, London, N.17 make a special ink for celluloid materials.

We specialize in making rubber plates for this purpose, all for use on ordinary printing presses or rotary printing machines.

DAVID CORBET.
67, McAlpine Street,
Glasgow, C2.

EXPORT INQUIRY.—Paul Püchler, Siebenbrunnengasse 30, Vienna V, is interested in plastic materials of all kinds as imports to Austria, and for re-export to the East and the Balkans. He would like to contact English manufacturers.

New Productions in Plastics

Polythene Containers

A new group of polythene containers with which Tenaplas, Ltd., of Upper Basildon, Berkshire, hope to attract important home and export orders from chemical and allied manufacturers, are designed entirely to replace stainless steel for carrying corrosive liquids.

The group includes buckets and cans. Considerable experimental work was devoted to the design, and Tenaplas believe they have arrived at something quite useful in spout positioning. The buckets are extremely robust and are made in two sizes —1¼ and 2¼ gallons. The unique feature of their manufacture is that they are made from extruded tubing, which gives them an extremely smooth interior, a factor of importance when dealing with corrosive liquids.

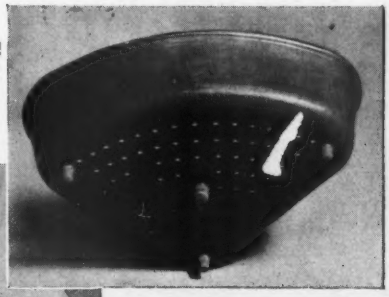
Well-balanced and easy to carry with the steel-reinforced carrying handle, completely polythene covered to avoid corrosion, the danger of liquid being spilt on the operative carrying the bucket is reduced to a minimum. Two kinds of lid are available, one with a lid over the spout, so designed that it need not be removed when the liquid is poured; the other is without a lid over the spout.

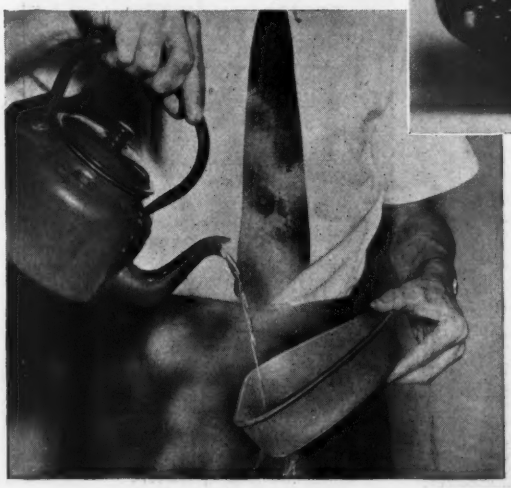
The polythene cans are produced in five sizes, from 16 fluid ounces to one gallon capacity. Non-standard sizes can be supplied to order.

The value of these new containers from the viewpoint of users of corrosive liquids is that polythene is non-corroding, and combines with its chemically inert properties the advantage of lightness in weight.

Polythene Sink Tidy

The sink tidy seen in the accompanying illustrations is injection-moulded in polythene by Godfrey Holmes (Plastics), Ltd., of Wragby, Lincoln. The underside has four stud-like projections which raise it sufficiently from the floor of the sink to provide good drainage of liquids. Polythene was chosen in making this article for several reasons: It is pleasant and warm to touch in cold situations; in use it does not chip nor suffer permanent distortion of shape; it makes no noisy clatter if dropped in the sink, neither will it damage the glazed surface of the sink when dropped. But most remarkable of all is the fact that this particular sink tidy (of polythene produced by I.C.I. under the name of "Alkathene") stands up satisfactorily to contact with boiling water. We tested the sample sent to us by holding it for 15 minutes under a running stream of scalding-hot water and we also immersed it in a cauldron of boiling water, yet the tidy emerged from this treatment without distortion or other ill effects. Satisfactory contact with boiling water is, of course, an important point as regards a domestic article of this type, which may require periodical scalding to maintain hygienic conditions.





Protective Film for Metal Pressings

These aluminium and tinplate pressings have been coated with a protective film of "Vinylite" resin. The significance of the shapes pictured here is that the pressing was carried out after the application of the synthetic resin film. Close inspection, however, reveals that despite the great strain to which the coating has been subjected, it has remained intact in each instance. (Photo: courtesy, Bakelite, Ltd.

Lemon Squeezer in Polystyrene

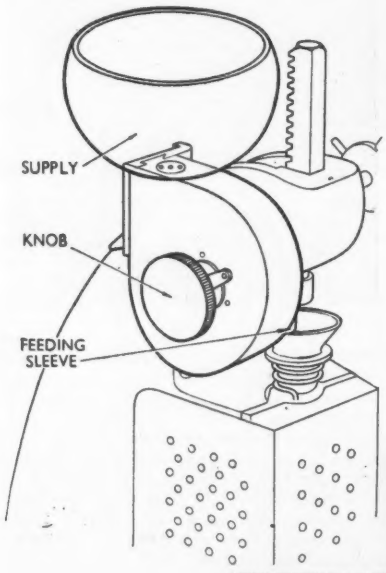
The moulded lemon squeezer seen in our illustration on the right is a new canted design which enables the user to squeeze the lemon with a mere turn of the hand, avoiding any extension of the arm at awkward angle. It is moulded in polystyrene by Runcolite, Ltd., 3, Vere Street, London, W.1. The design is by Gaby Schreiber, F.S.I.A.

PRODUCTION NEWS

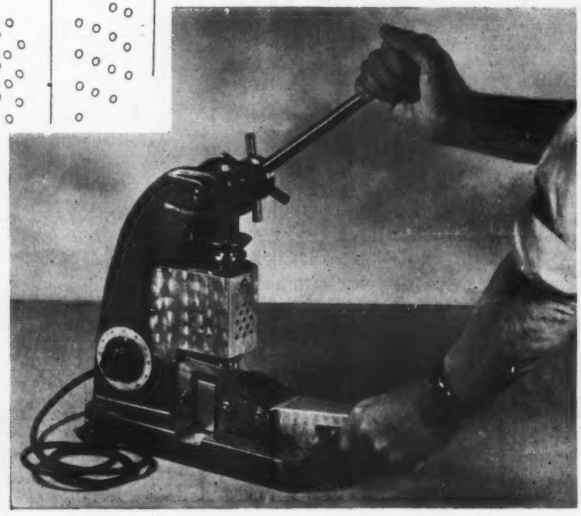
Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes

BENCH-TYPE INJECTION MOULDING MACHINE. — This hand-operated injection moulding machine, which we first noted in our July issue, has now been fitted by the makers, Asmidar, Ltd., 5, Rampayne Street, London, S.W.1, with a useful hopper which ensures an adequately continuous feed. The control knob serves to feed a pre-selected quantity of granulated plastic, the knob being indexed for the purpose. The transparent plastic bowl permits the operator to follow and control the supply of material. The hopper is fixed to the upper part of the machine, its feeding sleeve being inserted above the injection cylinder mouth, and the design prevents stoppages in feeding.

Obviously this very small machine has its chief application as an experimental tool in the general moulding shop for trying out a range of plastics and colour mixes, and for producing small prototype mouldings for customers. Furthermore, technical schools and "hobbyists" should find it useful. The manufacturers claim that although not what might be called a machine for mass production it is adequate for many production jobs of smaller runs.



(Above) Details of feeding hopper as now fitted to hand-operated injection moulding machine "A.P.5" (Asmidar, Ltd.).



(Right) The Asmidar machine seen in use.

WOOD TO METAL BONDING.—In veneered aluminium we have a good example of the typical invisible service that plastics are rendering to many industries. The all-important glue line of the permanent synthetic resin bond between aluminium and wood remains imperceptible even when engraved, as shown by one of the accompanying illustrations.

With the development of the bonding technique the laminated veneer-aluminium product is now available in sheet form ("Vendura"), and also in a range of designs or sections cold-rolled from the flat sheet ("Venduraform"). For many years it was considered impossible to obtain such high degree of formability on a laminated product. The commercially available grades of this material are veneered either on the one or both sides of the aluminium alloy sheet, with just the sort of decorative wood-veneers which people were so fond of imitating by various ingenious devices. The layers of real wood are not for the eye only; they offer a surface for glueing for the joinery assemblies, and to the designers of heating and lighting equipment the wood/metal sheet offers new and interesting thermal and mechanical properties.

(Above) Decorative treatment applied to "Vendura" by cutting away part of the veneer.

(Left) The general formability of "Vendura" is shown by this small sign, which is 21 ins. long.

In the course of intensive technical development work on "Vendura" and "Venduraform," Venesta, Ltd., and Warwick Sections, Ltd., have given considerable thought to the methods of application in various industries with the help of an industrial design consultant, Mr. George Fejér, M.S.I.A. Prototypes and sketch designs were discussed for the purpose of trying to meet the user's requirements, and to establish the recommended uses and limitations of the products. The small sign was made just to give an idea of the formability of "Vendura," noting that the silvery edges of the material can be shown frankly and with a good effect. The components were cut from the flat sheet and assembled by means of ordinary woodworking glues and a few screws.

Examples of mouldings produced on the Asmidar machine; the figure of Santa Claus is 2¼ ins. tall.

PLASTIC BOTTLES.—We regret that one of the illustrations to the article on "The Plastic Bottle" in the September issue of "Plastics" was wrongly captioned. The bottle by Creators, Ltd., seen in the illustration at the top left-hand corner of page 37, should have been described as made of polyvinyl chloride and not polythene.

THE IMPORT LICENSING DEPARTMENT of the Board of Trade (with the exception of the Machinery Section and staff dealing with European Recovery Programme claims) have transferred from their present premises in Regent Street, W.1, to Romney House, Tufton Street, Westminster, S.W.1. (Telephone, Abbey 9080.) The Machinery Section will remain at 91, Victoria Street, S.W.1. (Telephone, Abbey 7898.)

MICA DIRECTORATE has removed from Horseferry House, Thorney Street, London, S.W.1, to Empire House, St. Martin's le Grand, London, E.C.1. (Telephone, Clerkenwell 7931.)

LATHE TOOLS.—William Jessop and Sons, Ltd., Brightside Works, Sheffield, and J. J. Saville and Co., Ltd., Triumph Steel Works, Sheffield, have recently introduced an improved type of parting tool into their range of electrically butt-welded 10 per cent. cobalt high-speed steel tools. This tool has been submitted to severe and continuous testing under varying conditions. Parting tools are notoriously the weakest and the most troublesome of butt-welded lathe tools, and the introduction of the Jessop-Saville improved method of manufacture is a contribution to the elimination of trouble.

UNBREAKABLE ELECTRIC PLUGS.—In industrial situations where portable tools and appliances are extensively used, there is a high percentage of breakages with the orthodox moulded plug. Apart from the cost of replacement, which may be high, there is also a danger to personnel from contact with a broken plug. Wm. Sanders and Co. (Wednesbury), Ltd., Falcon Electrical Works, Wednesbury, Staffs, first introduced their unbreakable plug in 1937. Tests show that these plugs are unharmed by contact with the wheels of vehicles weighing as much as 9 tons.

B.I.P., LTD., announces the appointment of new directors to the boards of two of its subsidiaries—The Beetle Products Co., Ltd., and Beetle Bond, Ltd. Mr. A. T. Mansie, secretary of The Beetle Products Co., Ltd., and Beetle Bond, Ltd., becomes a director of both companies. Major G. E. Barlow, sales manager, and Mr. K. J. Mendl, export sales manager of The Beetle Products Co., Ltd., join the board of that company. Mr. W. V. Fitzmaurice, sales manager of Beetle Bond, Ltd., has been elected to the board of that company.

BRITISH HOMOPHONE CO., LTD.—In his speech at the annual general meeting of the British Homophone Co., Ltd., held in London, September 28, Sir Herbert Morgan, chairman of the company, referring to the period under review, said the consolidated profits which the group earned in the previous year were maintained during the first six months only. In the second half of the year there was a substantial falling-off in those of Ebonestos Industries, Ltd. Last year he gave some indications of the reasons why he thought that the moulding industry (in particular certain of the fields in which the company was interested) was entering a difficult trading period. It may well be that at the present moment the productive capacity of the compression side of the moulding industry as a whole is greater than the potential demand. The directors, however, despite present difficulties, view the long-term outlook for this group of companies with confidence. As shareholders knew, the Homophone Company, with its wholly owned subsidiary, is controlled by Crystalate, Ltd. Both Crystalate and Ebonestos Industries are among the oldest established in the moulding trade.

Many of the company's customers, added Sir Herbert, have expended capital in putting down tools from which only a small number of mouldings have been called for. It is this excellent background of customers, and the great number of the tools which the group hold on their behalf, which inspires optimism for the future.

MONSANTO EXPORT ACTIVITIES.—Coincident with the need for still further effort to develop export trade, Monsanto Chemicals, Ltd., held a six-day export agents' convention in London during week ending September 24. Its objects were to give agents an account of the latest Monsanto products; to show them plant developments at Ruabon and at the new works at Newport, Mon., and to provide an opportunity for discussion and exchange of ideas on trading problems in the U.S.A., South Africa, India, and the countries of Europe, the Near East and Middle East.

SCOTT BADER AND CO., LTD., 109, Kingsway, London, W.C.2, have sent us a handy snap-ring file complete with copies of all their latest technical leaflets. The file is appropriately sectionalized with finger-tab guide cards and an index, and at the time of issue included over two dozen special leaflets upon the applications of the company's resins and co-polymer emulsions. New leaflets, as and when issued, will be sent to present recipients of the file.

G.R.L. PLASTICS, LTD., announce that as from September 19 the name and address of the firm has been altered to G.R.L. Floorings, Ltd., Empire House, 117-119, Regent Street, London, W.1. (Telephone: Regent 7562/4.)

STRAMIT BOARDS, LTD., of Stowmarket, Suffolk, and Uxbridge, Middlesex, inform all users of their building slab that as from October 1, 1949, the previous selling arrangements have been terminated by agreement with Bowaters Building Boards, Ltd. They have now opened their own Sales Dept., and enquiries should be made to Stramit Boards, Ltd., Packet Boat Dock, Cowley Peachey, Uxbridge, Middlesex. (Telephone: West Drayton 3021.)

A. C. WICKMAN, LTD., Coventry, inform us that Mr. G. R. Marsh, hitherto sales director, has now been appointed assistant managing director. He is a well-known figure in machine tool circles in this country and on the Continent. For many years he has studied the machine tool industry in Switzerland in which he was engaged in a technical capacity for some time. Mr. Marsh joined A. C. Wickman, Ltd., in 1934.

DR. F. RIESENFELD, A.R.I.C., has terminated his appointment and connection with Catalin, Ltd., of Waltham Abbey, Essex, of which he was a director and, since 1936, the technical manager. His present address is 35, Lincoln Court, London Road, Enfield, Middlesex.

P.I.G.S.—The result of the Medal Competition ("Healey" Cup) held by the Midland Section at Little Aston, September 8, is announced as follows:—Winner, C. A. Britton, 93−16=77; runner-up, W. E. Mitchell, 83−6=77; visitors' prize, A. R. Betteridge, 80−7=73. The winner was decided by score on the last nine holes.

The London Section held their fifth meeting on September 13 at Berkshire Golf Club, Ascot. For the "Waghorne" Trophy the winner was M. O. Bamberger—93, less handicap 20, net 73; runner-up, T. S. Crabtree—90, less handicap 14, net 76. For the "Higgins" Trophy the winner was T. S. Crabtree—3 up on bogey (handicap 14); joint runners-up, P. Smith and A. E. S. Matthews—all square on bogey, handicaps 8 and 12, respectively.

NOTES FROM BRITISH PLASTICS FEDERATION

Plastics Research Station

Although a scheme for setting up a research station for the plastics industry has been considered from time to time, the Federation has decided that it is inopportune to proceed further at present.

Jewellery and Silverware Development Council Order

The Moulders' and Fabricators' Groups have co-operated in preparing a case to seek exemption of trade moulders and fabricators from the scope of the Jewellery and Silverware Development Council Order. The case has now been submitted to the Board of Trade.

Mutual Aid in Industry

A meeting of the works managers of member firms of the Moulders' Group was held recently in London. A further informal meeting will be held at Southport to encourage works managers and technical staff to discuss their day-to-day problems.

Federation Abstracts

The Abstracts published by the Federation are now being distributed to many subscribers overseas.

Forthcoming Meetings

Oct. 11.—"Recent Progress in the Chemistry of Phenolic Resins," S. R. Finn, N. J. L. Megson and E. J. W. Whittaker (Ministry of Supply). S.C.I. Plastics Group. Royal Society of Tropical Medicine, Manson House, 26, Portland Place, London, W.1. 6.30 p.m.

Oct. 17.—"Plastics and Corrosion." H. Barron. Joint meeting, S.C.I. with London Section R.I.C. County Technical College, Essex Road, Dartford. 7.30 p.m.

Oct. 19.—Symposium on "Adhesives"; C. J. Moss (Aero Research Ltd.), "Adhesives for Metals"; L. E. Puddefoot (B.B. Chemical Co., Ltd.), "Adhesives for Plastics"; J. M. J. Estevez (I.C.I. Ltd., Plastics Division), "Adhesives for Wood." Plastics Institute, London Section. Waldorf Hotel, Aldwych, London, W.C.2.

Oct. 26.—Luncheon Meeting. Plastics Institute, London Section. Waldorf Hotel, Aldwych, London, W.C.2.

Successful Designing for Plastics Moulding—III

By W. M. HALLIDAY

TO serve as a general guide for the engineer-designer in selecting the most suitable plastics material for any given application, the author has detailed below the outstanding properties of each group of materials at present available.

(1) Phenol-formaldehyde Resins

The synthetic resins available in this large group of thermo-setting plastics materials are very extensively used, chiefly for electrical insulation work, and the following are some of the chief properties possessed:—

(a) High moisture resistance.

(b) Good resistance to the action of acids, alkalis, and solvents.

(c) With suitable fillers, of which a great variety can be used, these phenolics are extremely stable when subjected to continuous exposure to heat up to temperatures around 150 degrees C. In conjunction with mica fillers, for instance, they will be resistive to considerably higher temperatures.

(d) These materials possess very good resistance to oil, grease, petroleum, and water.

(e) They have high tensile strength, and if used with appropriate fillers also possess considerable shock resistance.

(f) The electrical insulating qualities are of a high order.

(g) The range of colours is restricted to the darker shades, but since this group of materials is largely employed for industrial purposes such a limitation is usually unimportant.

(h) They possess relatively high compressive strength and with the use of suitable fillers the impact strength is considerable.

(i) They possess very good thermal conductivity qualities.

(j) Very good surface finishes, within the colour range, are possible, and these materials mould extremely well and economically.

(2) Phenol-furfural Resins

(a) These materials are largely employed for industrial use and the colour range is very limited.

(b) They possess very high thermal resistance.

(c) All these materials, especially when mineral filled, are highly resistant to water or moisture absorption.

(d) They possess reasonably good mechanical strength, especially in tensile and compressive loading.

(e) Because of their excellent di-electric and anti-tracking properties they are largely used for the manufacture of components for the electrical apparatus industry.

(f) Very smooth and glossy surface finishes are readily obtainable, and the materials mould very well.

(g) Various kinds of filling substances, such as woodflour, fabric, and several minerals, are regularly employed to obtain additional strength or other features.

(3) Melamine-formaldehyde

(a) This material possesses considerable mechanical strength.

(b) Its heat resisting properties are great.

(c) It is extensively used for electrical components where insulation is required. It possesses great arcing resistance.

(d) The surface finishes are excellent.

(e) The colour range is very wide. All shades and hues are readily possible, this being derived with a high degree of permanency.

(f) The material is excellent for decorative purposes because of the great possibilities of colour blending and shading.

(4) Nitro-cellulose Materials

(a) This material is thermo-plastic, possesses great ease of manipulation, and may be fabricated in numerous economical ways.

(b) It is highly resistant to water and moisture.

(c) It is extremely light in weight.

(d) The colour range is practically unlimited.

(e) Surface finish is extremely good.

(f) The mechanical strength features are somewhat low especially when the component is stressed at certain temperatures.

(g) This material is also inflammable, and therefore should not be used for service conditions where it will be brought into contact with heat or flame.

(h) Nitro-cellulose material also possesses very considerable flexibility, in the moulded or sheet form. It is capable of being easily moulded by the injection process to intricate shapes and will form very thin wall sections.

(5) Cellulose Acetate

(a) Cellulose acetate has very good oil, solvent and petroleum-resisting properties.

(b) It is only slightly adversely affected by contact with most acids and alkalis.

(c) It has good resistance to water.

(d) The colour range is very extensive.

(e) In mechanical strength it is rather low, but components mould readily and therefore may easily be stiffened by means of ribs, and fillets, etc.

(f) This material has a high rate of expansion when heated, which feature renders it unsuitable for all precision industrial applications where the component is required to remain dimensionally stable under heated conditions.

(g) The material is non-inflammable.

(h) Extremely fine surface finishes are possible, whether in the moulded form, or in sheets, tubes and rods.

(6) Polystyrene

(a) This material possesses the remarkable quality of being highly resistant to low temperatures, and will be found to remain stable in form and shape and dimensions under such conditions.

(b) It is very light in weight.

(c) The resistance to strong acids, alkalis, and certain solvents, is excellent.

(d) It is also odourless and tasteless.

(e) Polystyrene also possesses remarkable light-transmitting qualities, which render it suitable for use in the manufacture of optical instuments, etc.

(f) It is transparent, or with certain compounds translucent features can be obtained.

(g) Its mouldability is extremely good.

(h) The thermal expansion rate is very small.

(i) The mechanical strength of this material, i.e., its tensile compressive and impact strengths, are rather low, which is one of the reasons why this excellent material is largely used for decorative articles where strength is not a serious consideration.

(j) Polystyrene also possesses very valuable high-frequency current insulation properties.

(k) It also is highly resistant to moisture.

(l) This material can be moulded or extruded very satisfactorily.

(7) Polythene

(a) This compound is wax-like, and almost fully resistant to contact with acids.

(b) It is practically completely insoluble.

(c) It is unaffected by strong sunlight, and is impervious to exposure to ultra-violet ray.

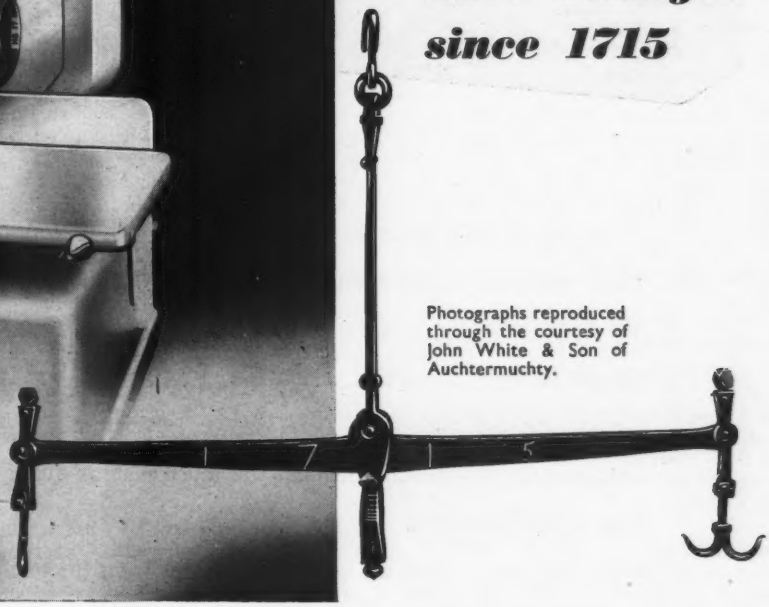
(d) This material also possesses the unusual and interesting property of being emulsified.

(e) It also has very good insulating qualities especially for high-frequency discharges.

(f) It is extensively used for making gaskets, seals, stoppers and the like components for use in conjunction with acid containers and measuring vessels.

(g) It can be moulded, extruded or calendered.

ideas have changed since 1715



Photographs reproduced through the courtesy of John White & Son of Auchtermuchty.

Compare this old Weigh Beam, made by John White's ancestor at Auchtermuchty in 1715, with the gleaming white counter scale made by the same firm and exhibited at the recent Scottish Industries Exhibition. Through two and a quarter centuries John White & Son have retained to the full their traditional skill of making weighing apparatus. Still moving with the times they house their latest counter scale in moulded plastics, made by British Moulded Plastics Ltd.

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B·I·P GROUP

(8) The Vinyls

This range of plastic materials, of which three very common forms are extensively employed, possesses very interesting qualities as under:—

(a) They have considerable pliability and therefore are employed to replace natural rubber.

(b) They are also used as bases for adhesives.

(c) They have excellent water-absorption qualities.

(d) Very glossy surface finishes are possible.

(e) The colour possibilities are practically unlimited.

(f) Certain forms of this material have remarkable ageing resistance.

(g) Certain forms are able to withstand prolonged exposure to high temperatures, i.e., up to and even beyond the boiling point of water.

(h) One of the vinyls, i.e., p.v.c., possesses high resistance to abrasion; because of this feature it is often used as a substitute for leather and rubber.

(i) Certain forms can be readily calendered and applied as very thin coatings to textile fabrics to produce imitation leathercloths.

(j) Vinyl material is also widely used for packaging and sealing purposes, especially for articles which have to be dispatched to hot and humid climates. It is unaffected by contact with natural mould, it resists very effectively attack and infection by insects, or deterioration due to moisture. It is also an excellent waterproofing material.

(9) Urea Resins

These thermosetting materials are available in a variety of grades and colours and are extensively employed for the manufacture of toys, domestic ware, lamp shades, electrical accessories, etc.

(a) Colour is light-fast and of a very high quality. The range of shades possible is unlimited.

(b) Urea mouldings are apt to be brittle, however, as the mechanical strength is low.

(c) They are exceedingly light in weight.

(d) Urea is water and moisture resistant to a reasonably good degree, but it will prove unsuitable for service conditions necessitating its continuous immersion in water.

(e) The material moulds extremely well and gives a very fine surface finish. Considerable skill, however, is required to mould parts of intricate shape owing to the flow features.

(10) Casein

(a) The electrical insulating properties of this material are excellent.

(b) The flammability factor is very low.

(c) A very wide range of colours and pastel shades are possible.

(d) Its mechanical strength is moderately good, but certain forms are inclined to be brittle, particularly where large surface areas have to be moulded unsupported by ribs, beadings, etc.

(e) The surface finishes obtainable with this material are very fine and it possesses a pleasing "feel."

(f) Its heat-resisting capacities are fairly good, but it cannot be subjected to excessive temperatures otherwise deterioration of the colour takes place.

(g) This material can be obtained in powder form for the purely moulding processes or as sheets and rods, etc. It can also be extruded very economically, as well as being manipulated by a number of other fabricating processes.

(h) Casein is affected by acids and alkalis.

(i) It is one of the least expensive plastics materials, which factor, coupled with its ready mouldability renders it one of the most economical of present-day plastics.

(j) Certain grades of casein can be obtained which are transparent to a certain degree. The transparency falls short of the quality and purity required for optical purposes, however.

(11) Miscellaneous Materials

In addition to these basic plastics materials, innumerable and valuable combinations, or adaptations of these, are also available in the shape of what are known as "laminates," films, foils, adhesives, treated fibres, surface coatings, sheetings, extruded rods and tubes, and so forth.

Ordinary engineering materials, such as the light metals, wood, etc., are treated, or coated with suitable plastic substances in order to improve certain specific qualities. In some cases such materials, notably plywood, are impregnated to give exceedingly strong yet very light materials, possessing superior surface finish, impermeability to moisture, acids, etc., or to imitate graining of natural materials.

These materials, in addition to the normal moulding powders already mentioned, give a remarkable range of materials for the use of the engineer.

Size Restrictions on Moulding

Plastics materials lend themselves to moulding and manipulation to an amazing extent, often, too, with great economy when compared with ordinary forming processes required for steel, iron, wood and such-like materials. The designer should, however, constantly bear in mind that this ready mouldability only holds good within a certain range of component size. Departure from this range tends to decrease the speed of production, to increase the cost of mould manufacture and also to increase unduly the final cost of the moulded products.

Maximum size of article which can be moulded cannot be definitely fixed owing to the fact that it is considerably influenced by the nature of the material employed, the quality and size of the permissible moulding tool and the size of the moulding press or injection equipment available.

In the case of the thermosetting materials, which are compression moulded, a component will generally prove relatively costly if its length exceeds about 20 to 24 ins., or if the width and depth are greater than about 12 to 14 ins. Few components are in fact regularly moulded beyond these dimensional limits.

Another restricted factor is that of wall thickness. If this exceeds $\frac{3}{4}$ in. the length of cure time involved to obtain a complete set will be of such a duration as to render the operation uneconomical as a production method.

Articles of very small size can be moulded very simply, and if quantities warrant, multiple impression moulds can be used to give a boost to production. It has also to be borne in mind that if the aforementioned limiting dimensions are exceeded, the mould manufacturing and manipulating costs will be considerably increased.

Similar restricting factors are associated with the moulding of the thermoplastics by the injection process. With extant injection moulding machines, it is rarely possible or economical to produce articles weighing more than say 30-36 ozs. Limitations arise also in respect of the surface area of the component. This latter point determines the overall size of the mould, which latter, in turn, are also controlled as to maximum size by the injection machine on which they will be used.

In injection moulding it is also very important to maintain wall thickness within specific limits, i.e., preferably this should not exceed .125 to .140 in. The wall sections should also be held as near uniform as possible; this indeed is a most important point as will be more fully explained in later sections when actual component design forms are developed and illustrated.

Rigidity, stiffness, and strength of wall sections on an injection moulded component can often be reinforced by the inclusion of ribs, fillets, beadings, channel sections, etc., so much so that relatively thin-walled articles can be moulded to withstand considerable loads, and weights. The incorporation of such strengthening features is, of course, one of the duties falling to the lot of the component designer, and he will have to determine the best location and form for such items.

The diversity of materials and features is in one sense a challenge to the designer; as so great a choice is presented to him there is little necessity or excuse remaining for him to imitate design forms required for other kinds of manufacture, in the way which has frequently occurred in the past.

(To be continued.)

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2/- each.

B.P. 622,914. Appl. 12.6.45. Conv. (France) 2.3.44. Acc. 10.5.49.
Depolymerization or Degradation of Natural or Synthetic Rubber in the crude state and for the regeneration of vulcanized or partly vulcanized rubber. A. Lemercier. To: Société Electro Cable.
Depolymerization or degradation is effected by infra-red radiation.

B.P. 623,546. Appl. 9.11.45. Acc. 19.5.49.
Injection Moulding Machines. To: Improved Paper Machinery Corp.

B.P. 623,736. Appl. 13.4.46. Acc. 23.5.49.
Joining Materials by High-frequency Heating. C. E. E. Clarke and P. L. Micklewright. To: Standard Telephones and Cables, Ltd.
Electrode system for welding of plastics and subsequent cutting of the contour of the welded article with the same electrode system. Seams are made in such a way that severance along the outline is facilitated.

B.P. 624,084. Appl. 29.4.46. Conv. (France) 19.2.45. Acc. 27.5.49.
Packing of Plastic Material for pharmaceutical tubes or the like and similar objects. C. Nicolle.
Multi-unit containers made from welded cellulose acetate sheet, heat sealed and perforated for ease of detachment of individual units.

B.P. 624,092. Appl. 12.7.46. Conv. (U.S.A.) 30.8.45. Acc. 27.5.49.
Heating Dielectric Materials Electronically. To: Radio Corporation of America.
Conveyor drying of moisture-laden articles (rayon cakes) by dielectric heating. Details of electrode system are described and method of adjusting field intensity to changing conditions due to repulsion of moisture.

B.P. 624,174. Appl. 2.5.46. Conv. (Italy) 21.6.44. Acc. 30.5.49.
Manufacture of Articles of Thermoplastic Synthetic Resins. To: S. P. A. Lavorazione Materie Plastiche.

B.P. 624,225. Appl. 17.6.47. Acc. 31.5.49.
Production of Thermoplastic Elastomers of Polyvinyl Chloride. S. Szekely and C. A. Redfarn. To: Boothby and Thompson, Ltd.
Production of polyvinyl chloride elastomers by heating a p.v.c. composition which has been precompounded with a substantially non-polymerizable plasticizer and a diallyl or substituted diallyl ester of a polymethylene dicarboxylic acid.

B.P. 624,311. Appl. 10.12.45. Conv. (U.S.A.) 26.1.45. Acc. 2.6.49.
Laminated articles. T. W. Evans and E. C. Shokal. To: Shell Developments.
Laminated articles consisting of a plurality of superimposed sheets comprising one or more sheets of a bibulous paper or close-woven fabric and a sheet of fabric made from non-bibulous fibres or filaments (nylon or vinyl halide copolymers) bonded together with a thermoplastic or thermosetting resin.

B.P. 624,312. Appl. 18.12.45. Conv. (U.S.A.) 13.1.45. Acc. 2.6.49.
Vulcanized Polyfurfuryl Products. To: J.B.P. Foundations.

B.P. 624,329. Appl. 3.7.47. Acc. 26.4.9.
Heating Sheet Material by producing electric stress therein alternating at high frequency. B. I. Callenders, Gramophone Dev Co., and E. C. Hill.
Multi-purpose welding electrode which can be adapted to any contour of surface. Consists of a number of metallic elements which are adjusted by screws and metal-foil, contour of which can be adjusted by means of interposed strips of rubber, etc.

B.P. 624,361. Appl. 8.3.46. Conv. (U.S.A.) 9.3.45. Acc. 7.6.49.
Organo Silicon Compounds. To: Westinghouse Electric International Co.

B.P. 624,362/4. Appl. 8.3.46. Acc. 7.6.49.
Organo Silicon Compounds. To: Westinghouse Electric International Co.

B.P. 624,393. Appl. 28.3.47. Acc. 7.6.49.
Compositions comprising Vinyl Chloride Polymers or Interpolymers. K. W. Small and P. A. Small. To: I.C.I., Ltd.
Refers to the use of polyester plasticizers derived from pentamethylene glycol and glutaric acid.

B.P. 624,433. Appl. 2.5.46. Conv. (Italy) 21.6.44. Acc. 8.6.49.
Manufacture of articles of Thermoplastic Materials and articles produced thereby. To: S.P.A. Lavorazione Materie Plastiche.

B.P. 624,457. Appl. 5.11.46. Conv. (U.S.A.) 20.12.45. Acc. 9.6.49.
Printing of Nylon. H. H. Bestehorn and H. W. Grimmel. To: General Aniline and Film Corp.

B.P. 624,550/1. Appl. 1.7.47. Acc. 10.6.49.
Organo Silicon Compounds. J. T. Goodwin, Jr. To: Dow Corning Corp.

B.P. 624,631. Appl. 17.9.46, 14.3.47. Acc. 14.6.49.
Joining Polyvinyl Chloride Sheets. R. H. Czeczowitzka. To: Greenwich Leathercloth Co., Ltd.
Joining of p.v.c. sheets by interposing between two p.v.c. sheets a seaming tape coated with a low molecular weight polymer of lower softening point and uniting the sandwich by heat and pressure.

B.P. 624.634. Appl. 10.10.46. Conv. (U.S.A.) 9.11.44. Acc. 14.6.49.
Vinyl Halides and process of preparing same. To: B. F. Goodrich Co.
Preparation of vinyl halides by reacting acetylene with a hydrogen halide in the presence of bis (beta-chlorovinyl) chloroarsine as catalyst.

B.P. 625,670. Appl. 29.4.46. Conv. (France) 3.12.45, 9.12.43. Acc. 1.7.49.
Manufacturing of Containers in Plastic Material with moveable lid. C. Nicolle.
Containers and packings made from cellulose acetate. Moulded shapes; heat sealed; perforations for ease of detachment of individual units.

B.P. 624,736. Appl. 6.1.47. Conv. (U.S.A.) 5.2.46. Acc. 15.6.49.
Polychlorinated Aromatic Compounds. J. F. Weiler. To: Mathieson Alkali Works.

B.P. 624,792. Appl. 17.2.47. Conv. (U.S.A.) 1.3.46. Acc. 16.6.49.
Manufacture of Rosen Styrene Interpolymers. To: Dow Chemical Co.

B.P. 624,795. Appl. 7.3.47. Acc. 16.6.49.
Protective Gloves, Mitts, Boots and Shoes for workpeople. G. K. White.
Cotton-backed gloves, boots, etc., p.v.c. dipped.

B.P. 624,814. Appl. 1.7.47. Acc. 16.6.49.
Organo Silicon Compounds. J. T. Goodwin, Jnr. To: Dow Corning Corp.

B.P. 624,847. Appl. 24.8.45. Acc. 17.6.49.
Reinforcing Plastics. N. G. Quinn.
Method of reinforcing an ester gum with polythene by mixing the two components whilst in a mobile condition, afterwards shaping the composition by casting, moulding, etc.

B.P. 624,863. Appl. 3.6.46. Conv. (U.S.A.) 9.7.44. Acc. 17.6.49.
Artificial Eyes. To: American Optical Co.

B.P. 624,987. Appl. 22.7.47. Acc. 20.6.49.
Manufacture of Alginate Threads. E. E. Tallis and H. R. S. Clatworthy. To: Courtaulds, Ltd.

B.P. 625,026. Appl. 27.4.46. Conv. (U.S.A.) 9.5.45. Acc. 21.6.49.
Films for wrapping and other purposes. R. J. Reid. To: Firestone Tire and Rubber Co.
Refers to cast films of vinyl chloride polymers or butadiene acrybonitrile copolymers.

B.P. 625,144. Appl. 2.12.46. Conv. (U.S.A.) 6.1.43. Acc. 22.6.49.
Synthetic Resinous Products and process of making them. To: Frederick H. Levey, Co. Inc.
Refers to the production of low-cost keton aldehyde resins (acetone formaldehyde).

B.P. 625,281. Appl. 13.9.46. Conv. (U.S.A.) 16.10.45. Acc. 24.6.49.
Preparation of Di-(Chlorethyl)-Benzene and Divinyl Benzene. To: Standard Telephones and Cables, Ltd.

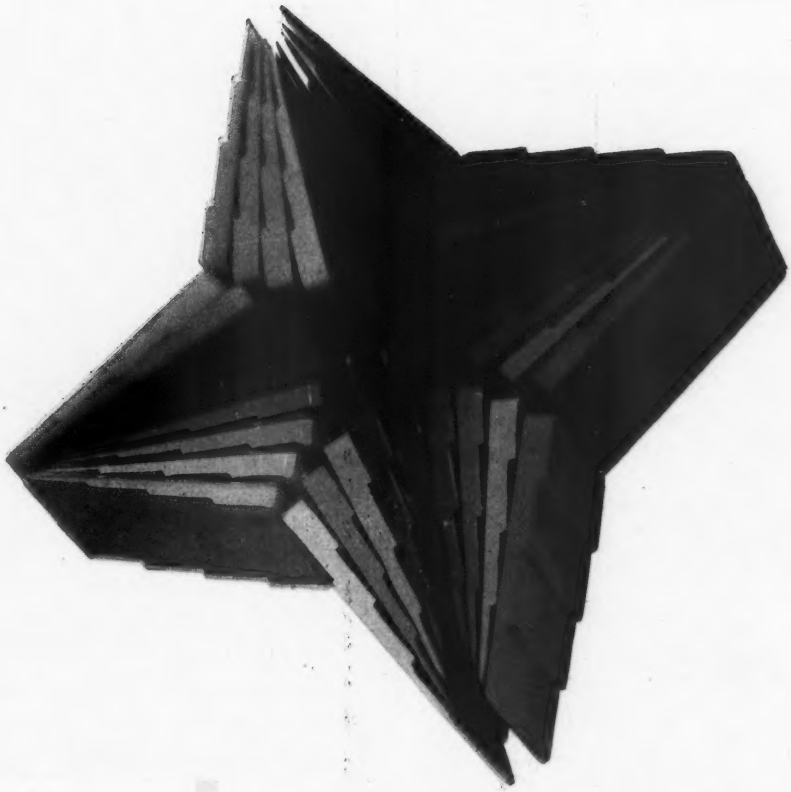
B.P. 625,305. Appl. 27.2.47. Acc. 24.6.49.
Production of Melamine. N. Booth and J. B. Gardner. To: British Oxygen Co., Ltd.
Production of melamine from dicyandiamide by heating under pressure.

INFORMATIVE LABELLING

(*Continued from page 77.*)

possible, tying in these with a trade name, that one more step in the public's education on plastics has been taken. So many people think of the word 'plastic' as being an all-inclusive word; in other words, the word 'plastic' covers all materials which people think of as being plastics. These people do not realize that the word 'plastic' is the name of a family under which there are many different groups, just as the words 'wood' and 'metal' cover any number of groups. The Committee felt that by mentioning the plastic material together with the word 'plastic,' and possibly a trade name, the public will begin to better understand our somewhat confusing industry and consequently buy better."

These reasons are pretty sound, and we must admit the truth of the danger of the far too generic "plastics." It remains to be seen how the public will receive them.



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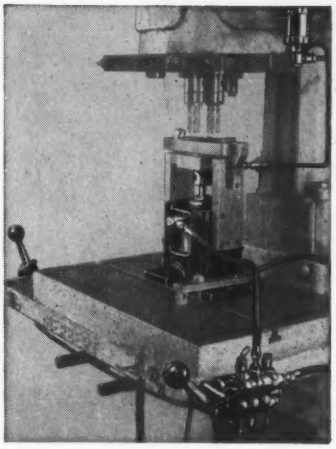

The number of manufacturing concerns who have increased output by installing Enots Air Clamp Pneumatic Equipment runs well into four figures. Here are a few users :
The Austin Motor Co. Ltd. B.S.A. Cycles Ltd. The General Electric Company Limited. The Hercules Cycle & Motor Co. Ltd. J. & H. McLaren Ltd. The Standard Motor Co. Ltd. The WIPAC Group.

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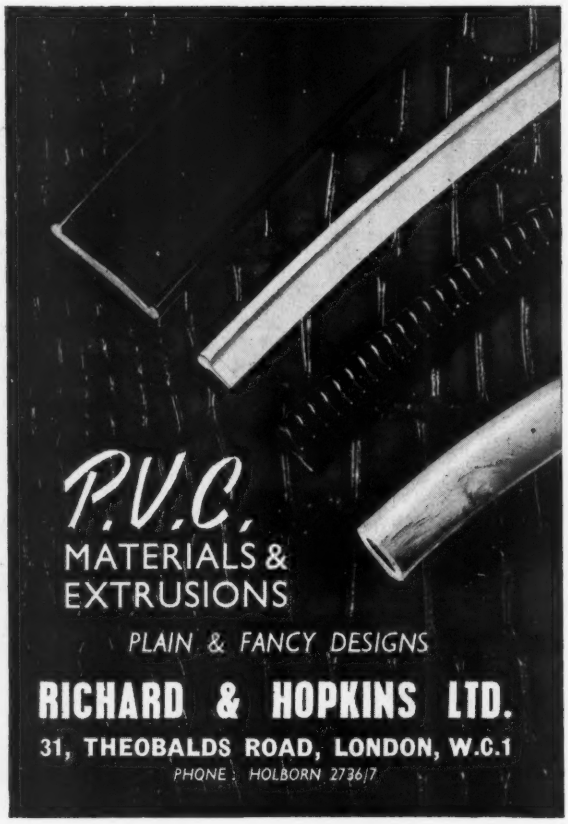

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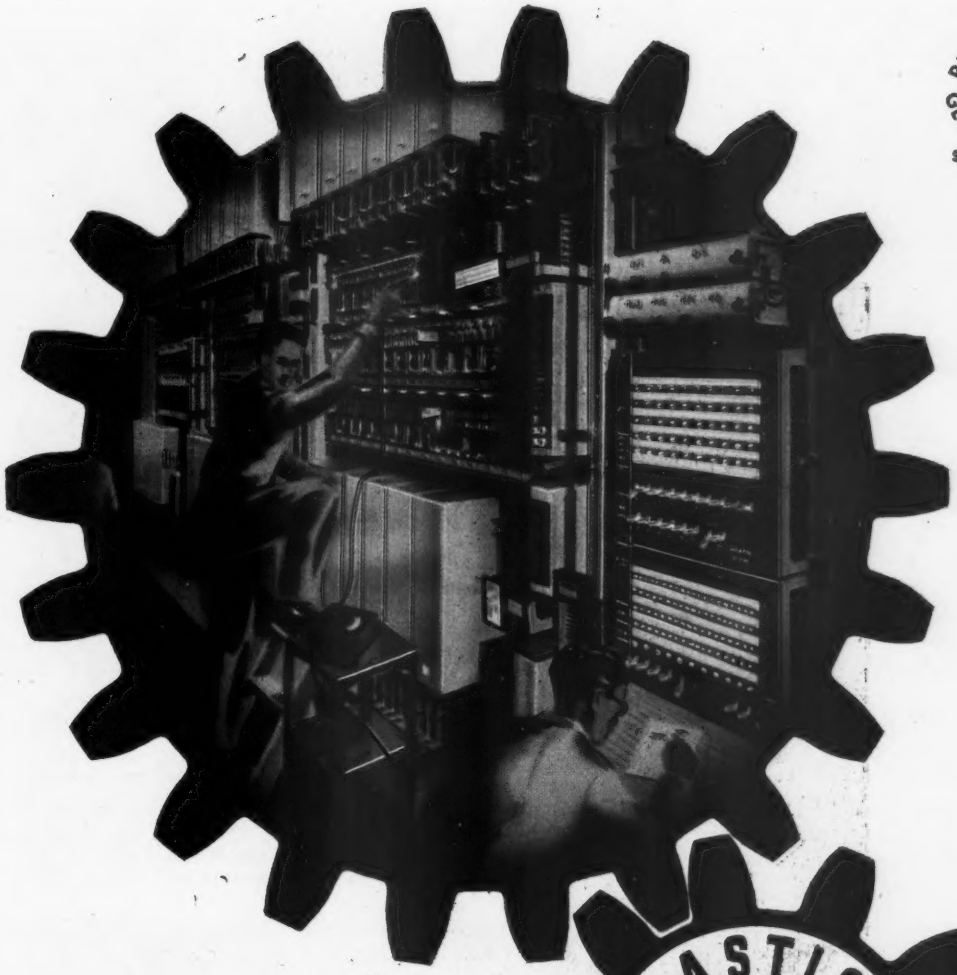

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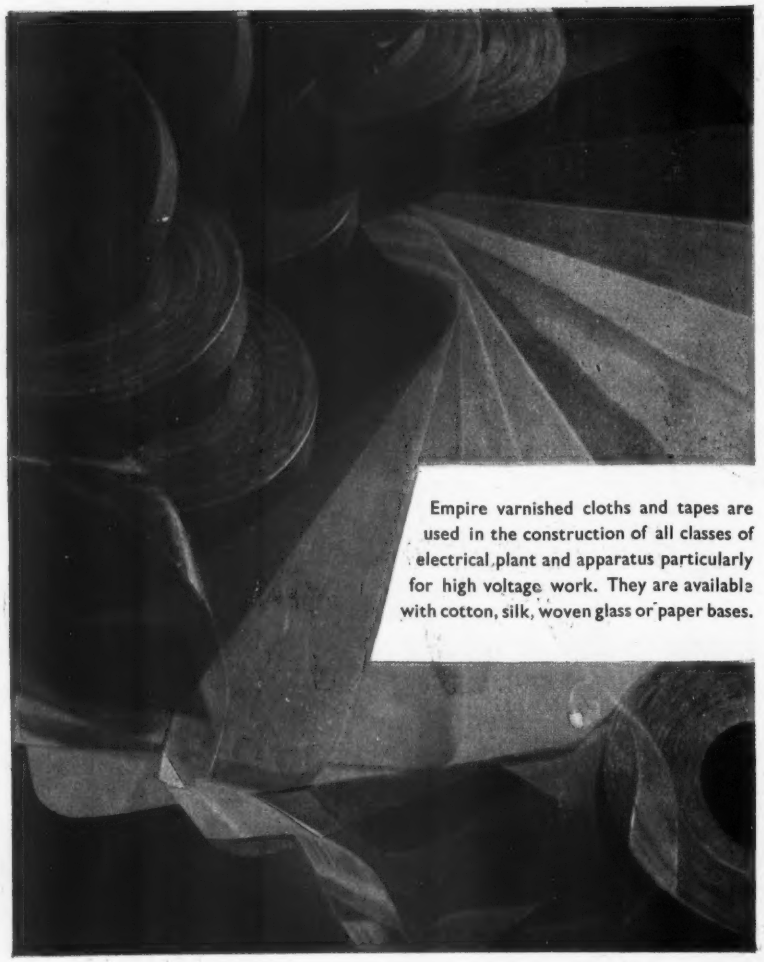
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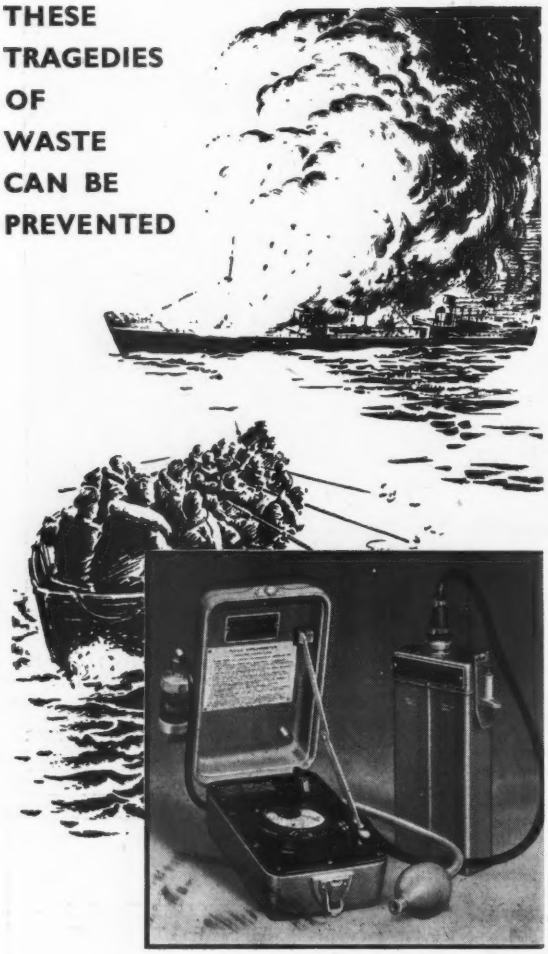

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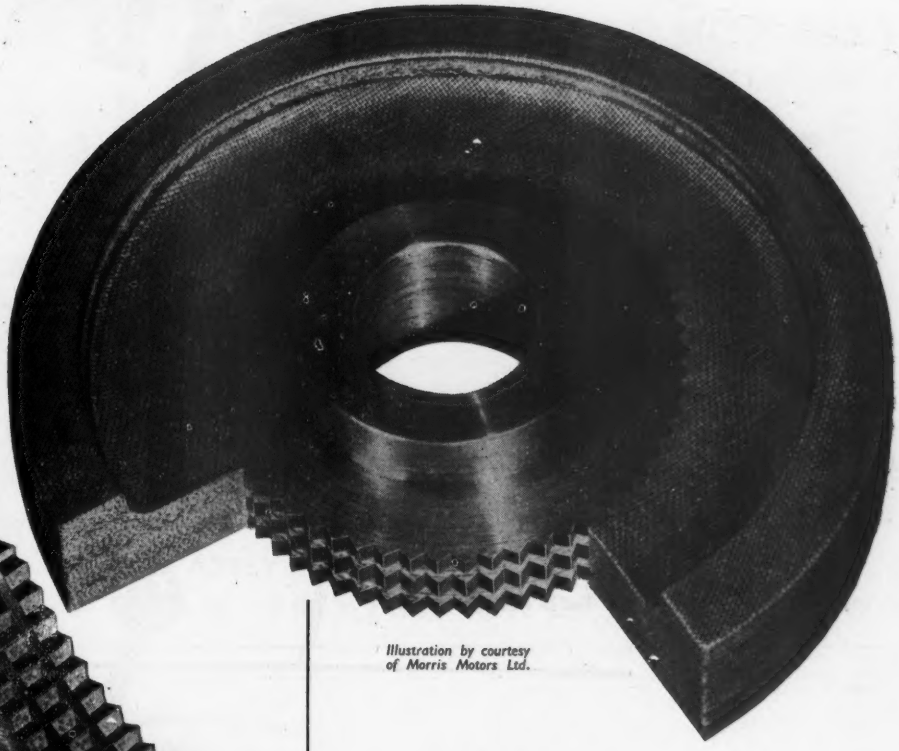

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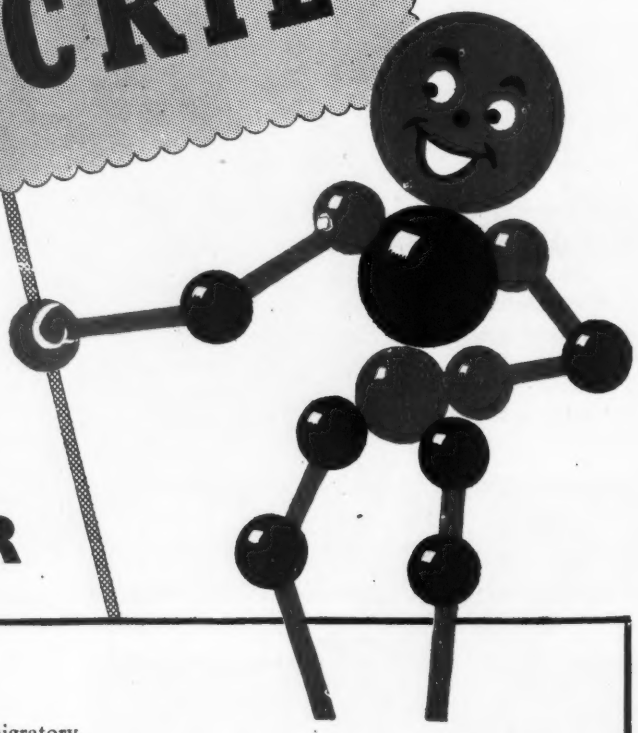

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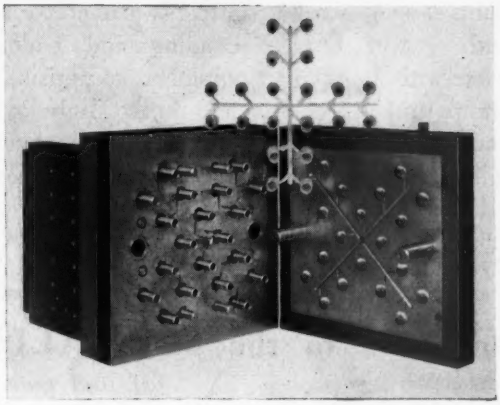

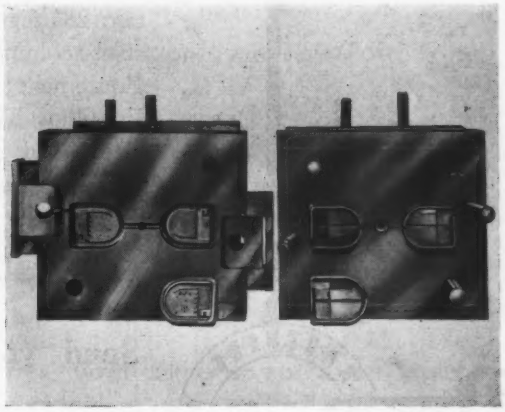

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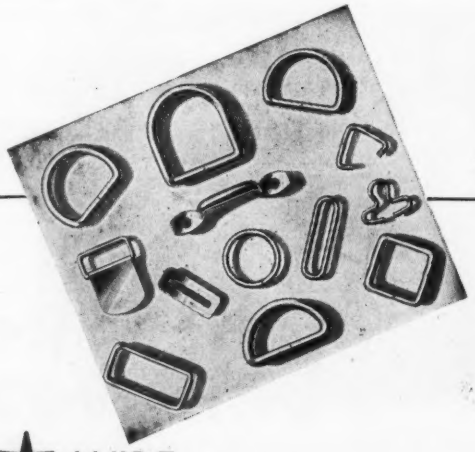

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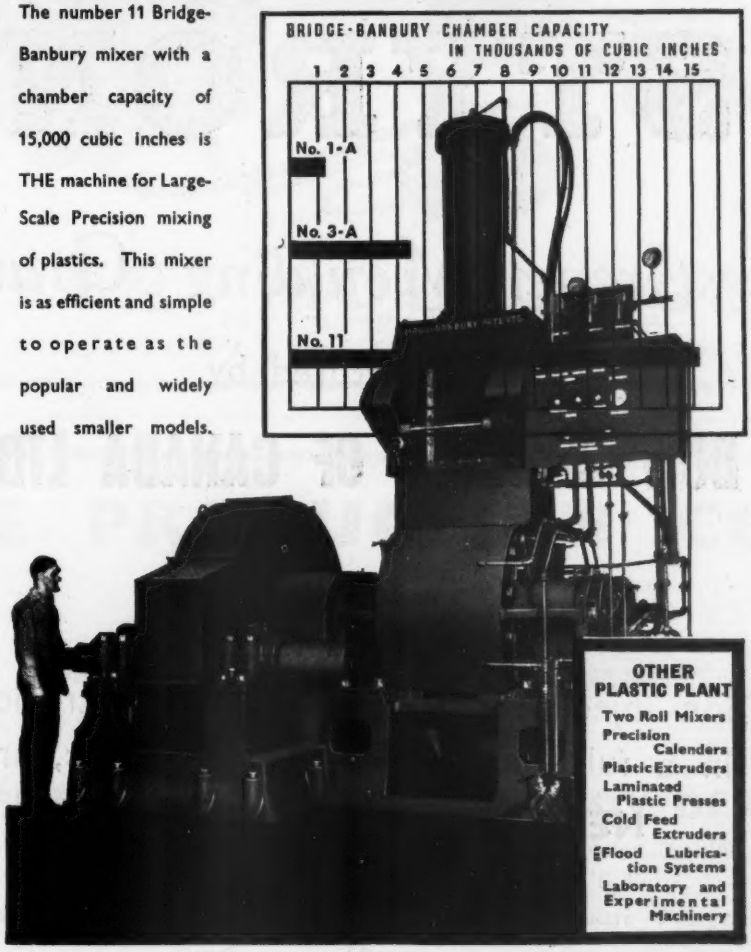

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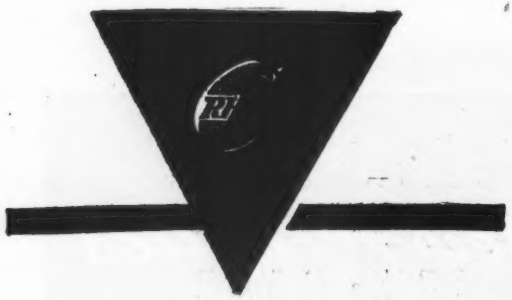

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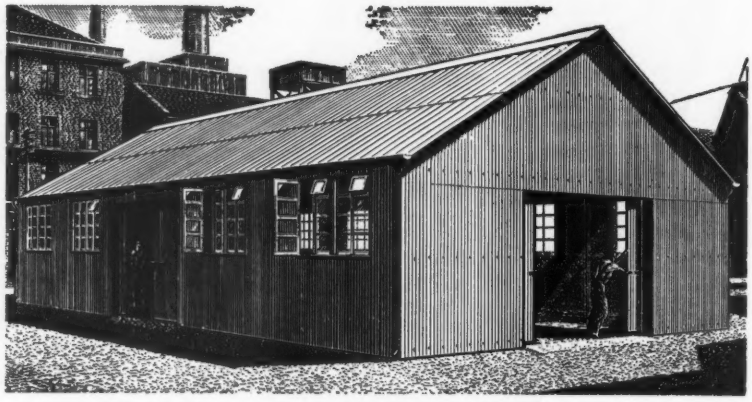

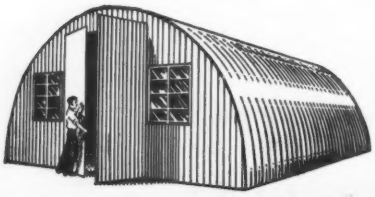

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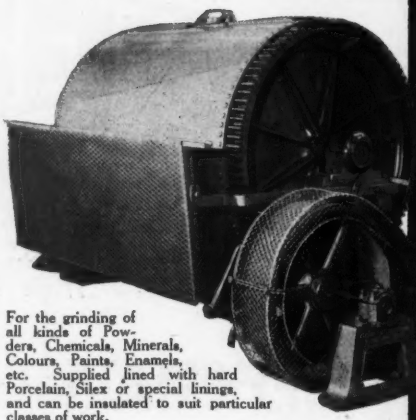

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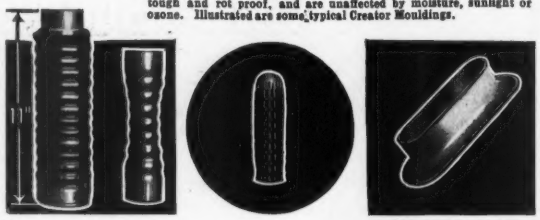

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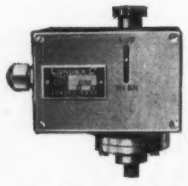

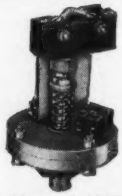

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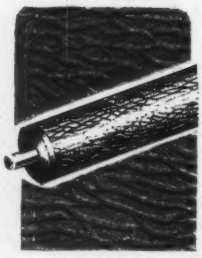

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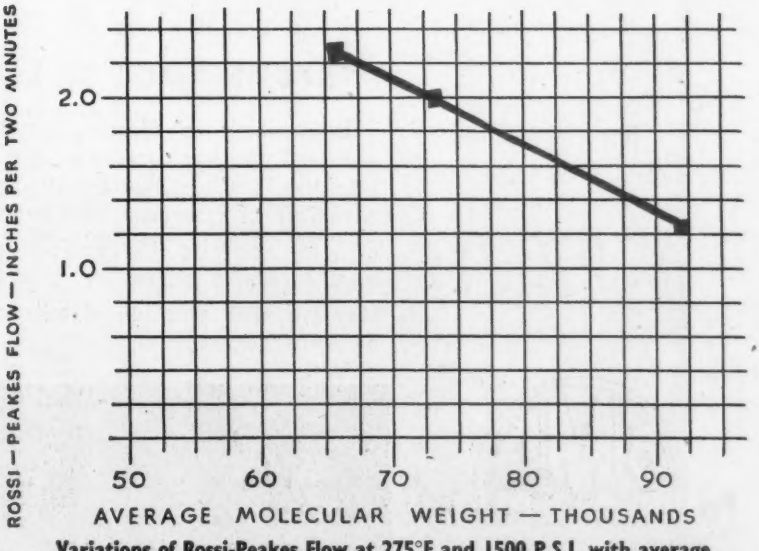

Variations of Rossi-Peakes Flow at 275°F and 1500 P.S.I. with average Molecular Weight of Lustrex

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Lightweight . . . Faster moulding . . .
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High dimensional stability . . .
Good chemical resistance . . .
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Gay colour range

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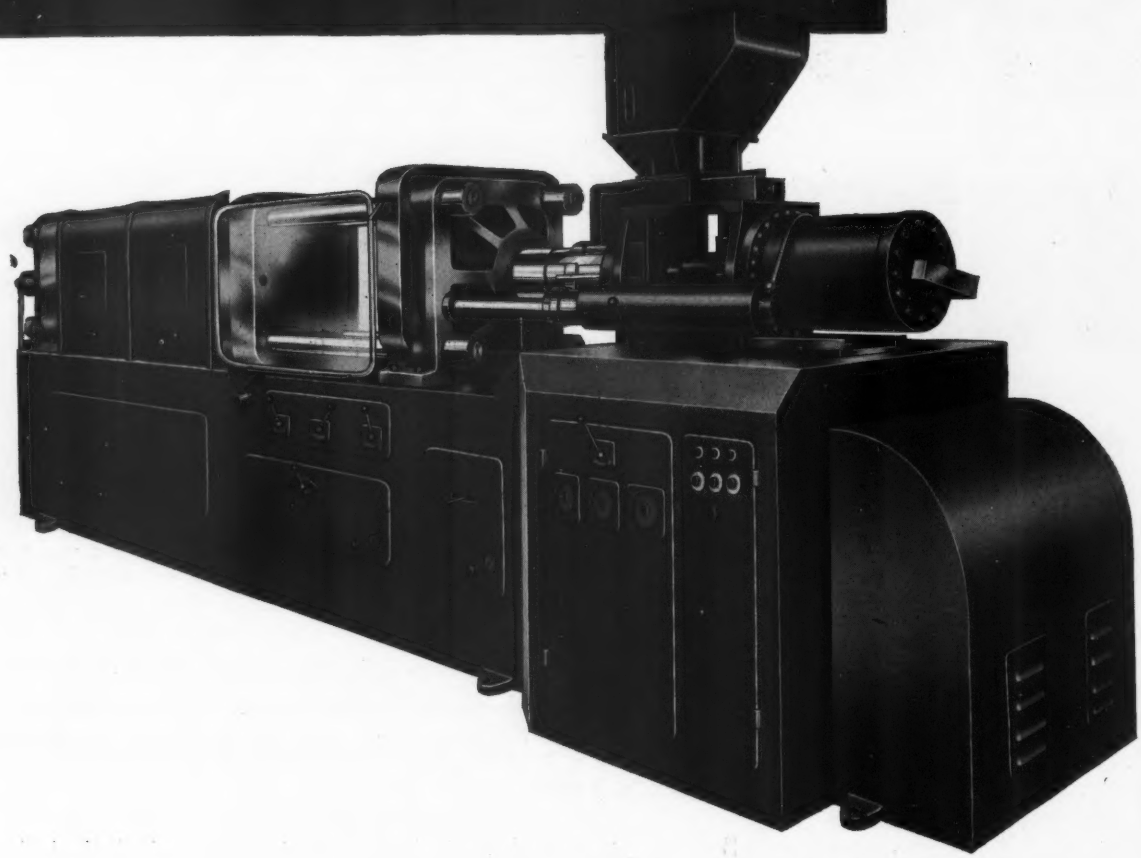
The S.H. 16/20

INJECTION MOULDING MACHINE
WITH AUTOMATIC TIME CYCLE CONTROL



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Other sizes also in production are S.H. 12/16, 16 ounce, and S.H. 24/28, 28 ounce.

May we send you full details of this machine or arrange for a demonstration?

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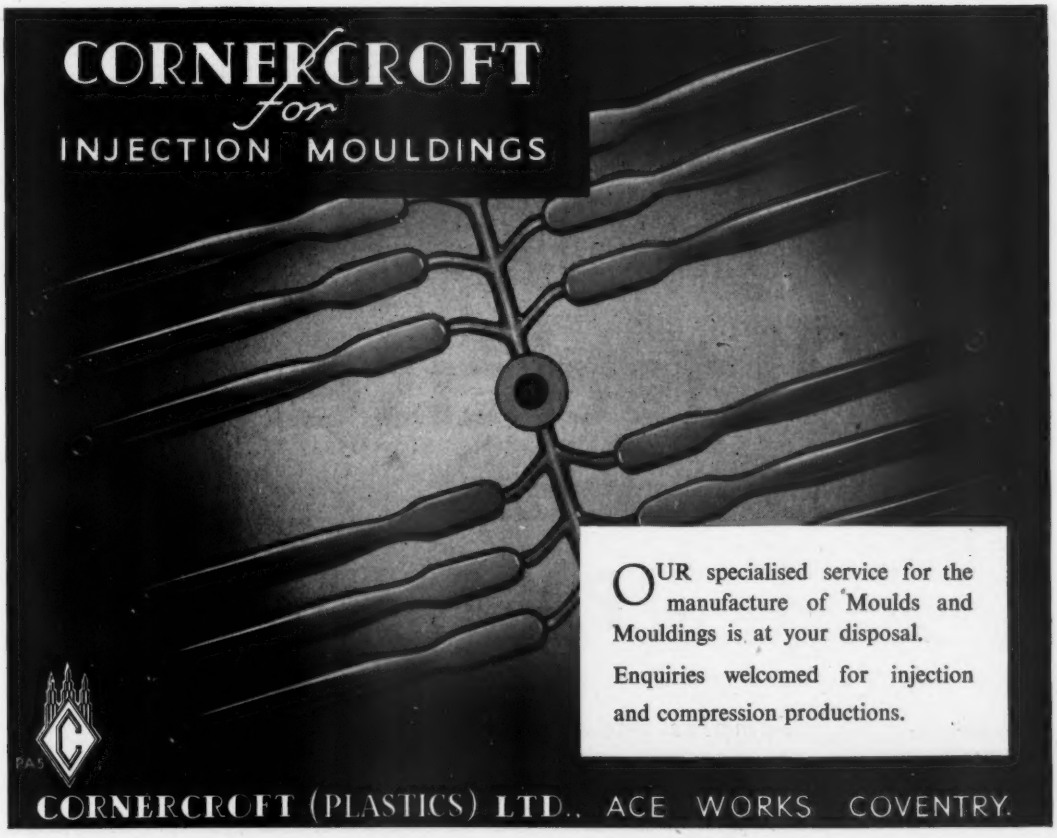
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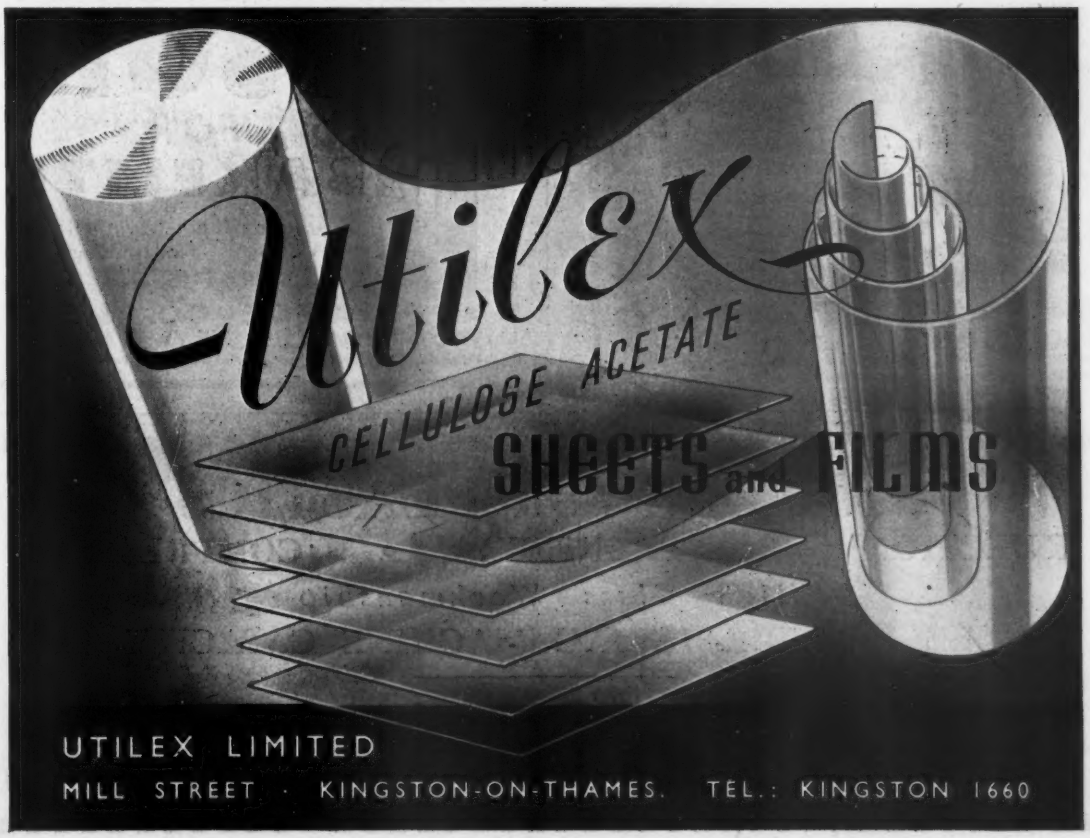
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is a useful plasticizer for polyvinyl chloride, cellulose nitrate, and other polymers. It is water white, free from odour, and has a very low volatility. Polyvinyl chloride plasticized with T.X.P. has excellent flame-resisting properties.

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TXW 68

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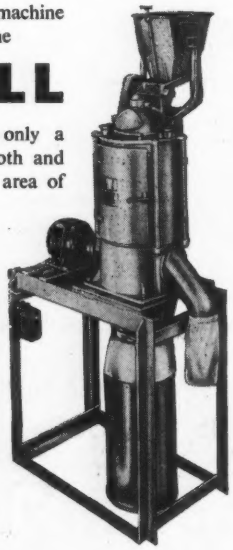

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COMPRESSION, TRANSFER AND INJECTION MOULDS, JIGS AND FIXTURES.

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The cycle of manufacture, moulding and re-grinding of Cellulose Acetate would appear to make this form of plastic indestructible. Re-processing, however, is necessary after a number of burnings.

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GRANVILLE HOUSE, ARUNDEL STREET,
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BOOKS AND PUBLICATIONS

MAGAZINES for disposal, several 100 volumes of "Plastics." "British Plastics" and "Modern Plastics" (U.S.A.). Gansolite, Ltd., York. 149-22

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PLASTIC COMPRESSION MOULDING BUSINESS FOR SALE as a going concern, situated within 50 miles of London. Business includes a modern tool room and a large number of moulding tools, covering a very wide range of merchandise. Price £30,000, exclusive of freehold, which may be purchased if desired. Principals only. Box P4911, care of "Plastics." 151-1231

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PLASTIC CONSULTANT offers immediate technical assistance. Mould and product design specialist. Strict confidence. Box P492, care of "Plastics." 149-x2725

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1,500 kW ((1.857 kVA) back-pressure-geared Turbo Alternator set, new 1940; comprising Adamson Steam Turbine No. T.286; fitted stainless-steel blading; 250 lb. working pressure; 650 degrees F. temperature, 6,000 r.p.m., 25/50 lb. back pressure; steam consumption at full load 50 lb., back pressure 55,880 lb. per hr. at 25 lb., back pressure 45,130 lb. per hr.; coupled through David Brown totally enclosed oil-filled reduction gear ratio 6,000/1,494 to 1,500 kW. Bruce Peebles, 11,000-volt, 3-phase, 50-cycle totally enclosed, water-cooled alternator, 1,500 r.p.m. No. 37,571; complete with remote-controlled switchgear; protective gear; L.T. distribution boards; instrument board; all valves, gauges, piping, oil circulation and clarifying plant, etc., and spares.

This set is in new condition, available December.

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One, ditto Senior Economiser.

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Two, ditto pumps each driven by 45 b.h.p. Steam Turbine 250 lb. per sq. in. exhaust 25 lb. p.s.i.

Two Hotwell Tanks, 18-ft. by 12-ft. by 6-ft.

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One Nekar Continuous blow down Plant

One Remote Control Panel.

One Range of high-pressure Steam Piping and Valves, various spares for all the above, etc.

The whole of this Plant was supplied new in 1940 and is in first-class condition.

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TWELVE PLATING VAT RUMBLERS by Cruickshank, 18-in. diam. by 21 ins. deep, belt driven, £25 each. Thompson and Son (Millwall), Ltd., Cuba Street, London, E.14 zzz-254

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Two Daniels semi-automatic pre-filling hydraulic presses, 75 tons, electric-heated platens 17 ins. by 14 ins., thermostat control.

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VERTICAL INJECTION MACHINE, 1½ oz. capacity, complete with air compression, Cottle V motor, must sell owing to expiration of lease, £175 complete. Details, Box P4917, care of "Plastics." 149-15

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MACHINERY, TOOLS AND PLANT WANTED

WANTED TO PURCHASE, IMMEDIATELY, 1½-oz. up to 3-oz. injection moulding machine, must be fully automatic and in sound working order. E. K. Cole, Southend-on-Sea. 149-21

25-TON DUAL-UNIT PRESSES, Finney type or similar, with or without electric Platens. Full particulars and price to Box P4921, care of "Plastics." 149-25

WANTED, Masson rotary cutter, small or medium size. Box P4920, care of "Plastics." 149-26

DUPLICATE TOOLS FOR EXPORT. Leading British manufacturers of plastic kitchenware, door knobs, etc., offer duplicate tools for outright sale to overseas manufacturers. For photographs and terms apply Box P4919, care of "Plastics." 149-27

NOTICES

The following registered Trade Marks were assigned on the 1st December, 1948, by the Beetle Products Company, Limited, of 1 Argyll Street, London, W.1, to British Industrial Plastics, Limited, of the same address, WITHOUT THE GOODWILL OF THE BUSINESS in which they were then in use.

No. 459097; Mark, Beetle (device); goods, musical instruments.

459099; Beetle (device); necklaces, brooches, pendants, tiaras and the like articles, being imitation jewellery.

459100; Beetle (device); glass.

459101; Beetle (device); manufactures from mineral and other substances for building or decoration but not including cement.

459103; Beetle (device); linen and hemp goods.

459105; Beetle (device); goods manufactured from indiarubber and gutta-percha.

459106; Beetle (device); wall coverings.

467097; Beetle (device), condensation products of a phenol, urea, thiourea and the like with formaldehyde and the like.

486792; Beetle (device); synthetic resin moulding materials or powders, made from urea and thiourea in condensation with formaldehyde.

522814; Beetle (word); moulding compositions setting under heat and/or pressure.

617780; Beetle-Bond (word); plywood.

149-1

THE TRADE MARK NO. 537540 consisting of the word "Beetleware" and registered in respect of articles moulded from thermoplastic or thermo-setting plastic-moulding compositions, i.e., compositions having a basis of synthetic resin, cellulose derivatives, casein, natural resins of bitumen, was assigned on December 1, 1948, by the Beetle Products Co., Ltd., of 1 Argyll Street, London, W.1, to British Industrial Plastics, Ltd., of the same address, without the goodwill of the business in which it was then in use. 149-2

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REPETITION in Ebonite, Erinoid, etc. Capstan lathe work. Mansell, Temple Street, Rugby. 149-543

DOHM, LTD., pulverize raw materials everywhere. 167 Victoria Street, London, S.W.1. zzz-259

STEEL MANDRELS. Centreless, ground to your requirements, 1/16 in. to 3-in. dia. and up to 20-ft. long. Rod and form grinding in all materials. Pen parts a speciality, also capstan and general machine capacity.

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"IMPOSSIBLE" MOULDING PROPOSITIONS invited by pioneer injection moulders with unusually qualified staff and most modern capacity up to 12 ozs. Inquiries in strict confidence and without obligation. Box P496, care of "Plastics." 149-5

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CAPACITY AVAILABLE, compression moulding 20-75 tons. Phenolic or Urea moulding materials. Keen and competitive prices guaranteed. Box P4914, care of "Plastics." 149-12

INJECTION MOULDINGS in thermo-plastics. Moulding in styrene, acrylics and acetate. Design and toolroom facilities available for mould construction. Inquiries invited. J. and E. Courtenay, Ltd., 138 Stratford Road, Birmingham, 11. 149-17

INJECTION MOULDING by I.O.G. Industries, Ltd., 41 Marshgate Lane, Stratford, E.15. Maryland 2804. 154-1229

FAIRMAN PRECISION TOOLS AND PRODUCTS, LTD., of Horley, Surrey, have capacity for the manufacture of bakelite and plastic moulds, diecasting dies, press tools and special purpose machines. Also all classes production machining. Phone, Horley 909. 154-1228

Production Capacity Available and Wanted (contd.)

PRINTING, ENGRAVING, ETC., on all types of plastics. Modern Plastics, Ltd., Kangley Bridge Road, S.E.26. 154-1230

WE ARE ABLE TO UNDERTAKE certain short or long runs of highly specialized medical and technical plastic moulded products, injection, compression or sheet fabrication, use our services for the preparation of prototypes; all inquiries strictly confidential. Box P4613, care of "Plastics." 151-1232

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EBONITE AND BAKELITE ALWAYS IN STOCK. Phone, Archway 3654. A. E. Goodeve, Ltd., 188a Seven Sisters Road, London, N.7. 151-634

"PERSPEX" FLAT SHEETS, clear and 17 colours, cut to shape; corrugated "Perspex" rooflights, aluminium sheeting, moulding, plastic panelling. Henry Moat and Son, Ltd., Atom Works, Newcastle, 1. 149-3

CELLULOSE ACETATE SCRAP for disposal. Best offers for regular monthly collections invited. Details from Edgware Optical Co., Ltd., 243 Deansbrook Road, Edgware, Middx. 149-x3324

MOON AIRCRAFT, LTD.,
SPECIALISTS IN MANIPULATED AND FABRICATED WORK.
OFFICIAL I.C.I. STOCKISTS FOR PERSPEX.
Have available from stock all thickness in clear and colour flat sheet cut to customer's sizes.
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PERSPEX! PERSPEX! PERSPEX!!! Official stockists for I.C.I. acrylic sheet. Sheets cut to your requirements. Fabrication and mounting specialists to the trade:—
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Always large stocks of
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sheets up to 1 in. thick.
CELLULOSE ACETATE.
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RECLAIMED X-RAY SHEET, blue tinted, 10 tons available in sizes approx. 6 ins. by 4 ins. to 12 ins. by 10 ins. at 1s. per lb.; minimum 1 ton lots. Larger sizes available at slightly higher rates.
Reclaimed nitrate X-ray sheet, blue and clear, 5 tons available at 1s. per lb.
Plastic scrap, very mixed assortment, colours and shapes, 3d. per lb. in 1-ton lots, 5 tons available.
Acetate flakes, clear, transparent, 6d. per lb. in 1 ton lots.
Clear transparent acetate sheet film, 10 ins. by 6 ins., 10 thou. thick, brand-new material, 2s. 9d. per lb. in 1 ton lots.
Transparent "Celastoid" sheets, 24 ins. by 27 ins. and 24 ins. by 54 ins. by 0.15 in. thick; pink, blue and green, 2s. 9d. per lb.; 5 cwt. available.
Opaque "Celastoid" sheets, 24 ins. by 27 ins. and 24 ins. by .015 in. thick; pink, cream and blue, 2s. 9d. per lb.; ½ cwt. available. 250 acetate sheets, blue, 56 ins. by 25 ins. by 20 thou thick, 10s. per sheet.
Crystal celluloid and acetate sheets, approx. 24 ins. by 20 ins. by .003 in., with light imprint. Approx. 1 ton available at 9d. per lb.
Lloyds, 4-5 Church Street, Christchurch. Phone, Christchurch 504. zzz-252

METAL POWDERS AND OXIDES. Quotations and samples on application. Dohm, Ltd., 167 Victoria Street, London, S.W.1. zzz-261

ALMEX, LTD., Exchange Buildings, Birmingham, offer coloured 1/16-in. I.C.I. Perspex acrylic clear polystyrene sheets, cable grade P.V.C., ebonite and tufnol sheet and offcuts. All at most favourable prices. zzz-265

ACCURATE INDUSTRIAL POWDERS. Dohm, Ltd., 167 Victoria Street, S.W.1. zzz-264

PERSPEX sheets and offcuts required, odd sheets or quantities, clear and coloured.
Handicraft Supplies, 26 Chapel Street, N.W.1. Amb 3689. 149-1154

POLYSTYRENE MOULDING powder and scrap wanted. Immediate cash on collection. Box P478, care of "Plastics." zzz-268

PERSPEX OFFCUTS, clear and coloured, for sale, all thicknesses. Box P485, care of "Plastics." 149-1193

SCRAP INJECTION MOULDING ACETATE collected from your works. Michael S. Stevens, Ormond Road, Richmond, Surrey. Phone, Richmond 0211. 149-24

ACETATE SHEETS.
40 thou., transparent, 56 by 24, weight 2¾ lbs.; ton lots, 4s. per lb.; 5-cwt. lots, 4s. 6d. per lb; cwt. lots, 5s. per lb. Below.
60 thou., green, blue, smoke, transparent, half-ton lots, 4s. 6d. per lb; 5-cwt. lots, 4s. 9d. per lb.; cwt. lots, 5s. 6d. per lb. Allans, 37 Farringdon Street, E.C.4. Cen 5947. zzz-270

POLYSTYRENE. Bulk quantities imported Continental material, obtainable for export work, all colours. Sterling Moulding Materials, Ltd., 11 Oxford Circus Avenue, W.1. 149-20

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Official stockists for I.C.I. acrylic Perspex, crystal and coloured, and "Crinothene" sheeting in all shades.
Offer acetate and celluloid transparent sheeting from 2s. per lb.
Bakelite laminated sheeting from 1s. 10d. per lb.
Coloured and clear Perspex off-cuts at 1s. 3d. to 2s. per lb., according to gauge and quantity required.
All types of plastic tubes and rod from 4d. per ft.
1¼-in. ribbed plastic belting at 6d. per yd.
Perspex No. 6 and No. 2 quick-drying cements and polishes.
Special offer of 1-oz. and ½-oz. amber bottles with plastic screw stopper at 15s. per gross.
Send for new stock list, which contains numerous interesting items to opticians and manufacturers of finished plastic goods.
Surplus stock purchased.
D. H. Ridout and Son, Ltd., Stedman Road, Southbourne, Bournemouth. 149-19

SCRAP. Why not let a well-established firm quote you for cellulose acetate, polystyrene and other thermoplastic off-cuts and scrap? Having best use for these materials, highest prices can be paid. Quotations on receipt of representative samples to M. H. Grist (Plastics), Ltd., 82-84 Brighton Road, Surbiton, Surrey. Phone, Elmbridge 4214. 149-18

P.V.C. SCRAP for sale, colours assorted, total quantity approximately 2 tons. Offers wanted. Box P4918, care of "Plastics." 149-16

ALKATHENE, GRADE 200, NATURAL, approximately 8 cwt. for sale, virgin material. Box P4916, care of "Plastics." 149-14

POLYSTYRENE in pink, light blue and white wanted against cash payment, good price paid. Write Box P499, care of "Plastics." 149-8

SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1947, or the vacancy is for employment excepted from the provisions of that Order.

VINYL TECHNOLOGISTS required as technical representatives, to be based on Manchester or Birmingham; rubber experience an advantage. Please write giving particulars of age, experience and salary required, to Technical Sales, British Geon, Ltd., 21 St. James's Square, Piccadilly, London, S.W.1. 150-1227

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REQUIRED, two colour technicians, one senior to take charge of plastics plant colour laboratory and batch standardization, one junior to assist. Reply, giving full details of education, training, experience and salary required, to Box P498, care of "Plastics." 149-7

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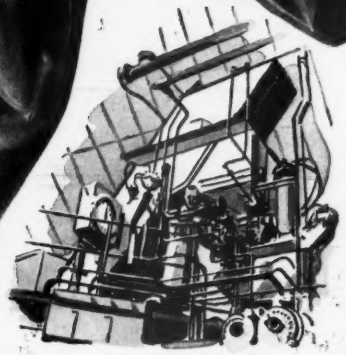

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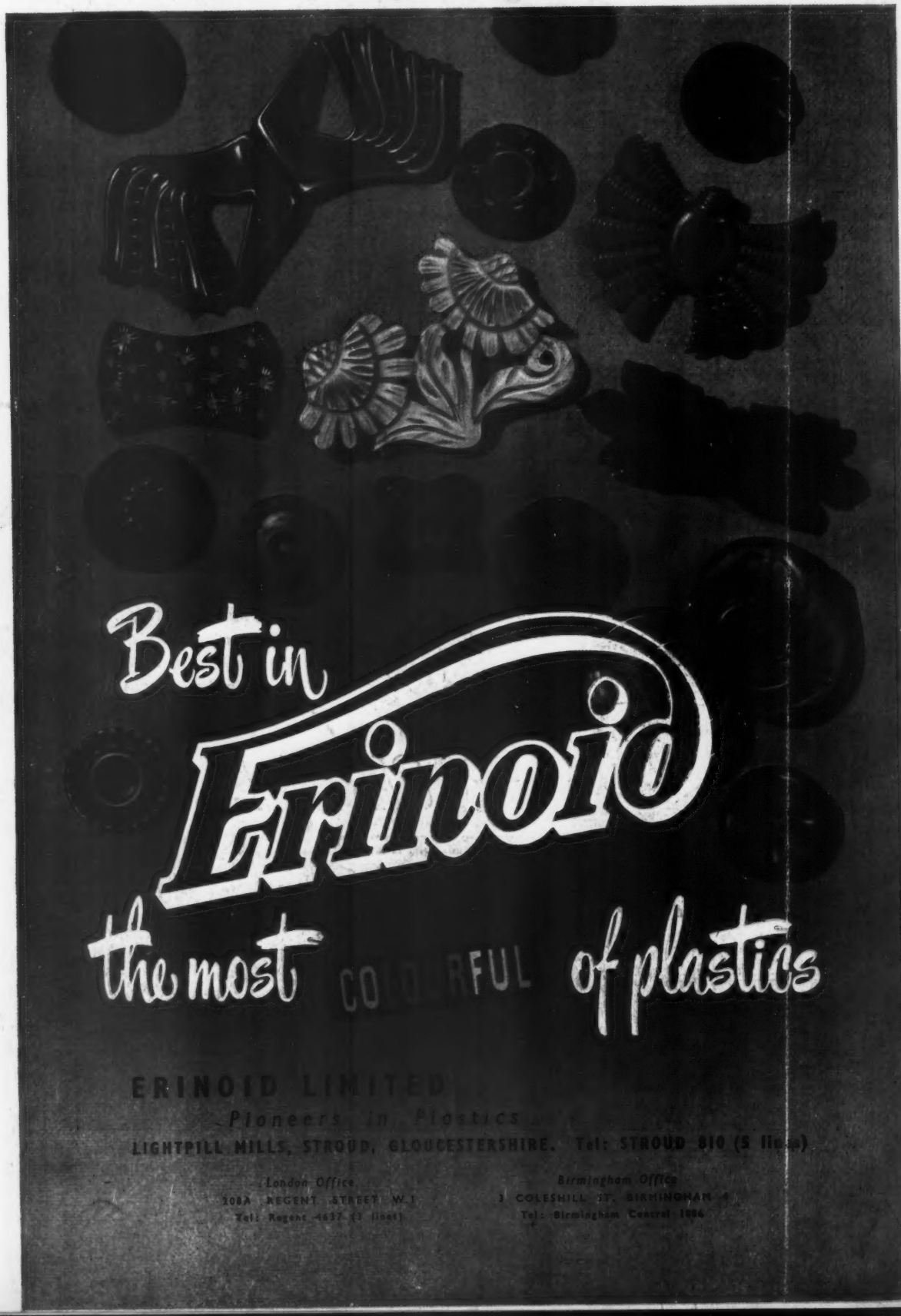
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